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Pet Ownership and Health

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CONTENTS

Tables	viii
Figures	x
Acknowledgements	xii
Declaration	xiii
Summary	xv
 SECTION 1 Introduction	 1
Chapter 1: The history of a belief	2
1.1 Animals and psychiatric populations	4
1.2 Animals and the general population	7
1.3 Pets as social catalysts	13
1.4 Effects of animals on human physiology	17
1.5 Pet ownership and health in the general population.	29
Chapter 2: Explanatory principles	35
2.1 Relationships between pets and their owners.	35
2.2 Attachment as an explanation for reported health advantages.	38
2.2.1 Attachment theory and "attachment" to pets	39
2. 2 A framework for the study of pet ownership and reported health benefits.	48
2.2.1 Non-causal association	50
2.2.2 Indirect causal association	53
2.2.3 Direct causal association	54

SECTION 2 Non-causal explanations	56
Chapter 3: Could Type A behaviour explain the association between pet ownership and health? (study 1)	57
3.1 Type A Behaviour	59
3.2 Method	61
3.3 Results	62
3.4 Discussion	68
Chapter 4: Hardiness as a factor influencing pet ownership and health	71
4.1 Hardiness	71
4.1.1 How does hardiness moderate stress?	73
4.2 Hardiness and pet ownership (study 2)	77
4.2.1 Method	77
4.2.2 Results	79
4.3 Hardiness, health and future pet ownership in a student population (study 3)	90
4.3.1 Method	90
4.3.2 Results	93
4.4 Discussion	104
4.5 Summary of studies investigating the proposition of a non-causal association between pet ownership and health.	109

SECTION 3 Indirect causal association	113
Chapter 5: Dogs as Catalysts for social interaction	115
5.1 Relationships, networks and health	115
5.1.1 Pets as social catalysts	119
5.1.2 Can pets bring health benefits as an indirect effect of social catalysis?	120
5.2 A dog as an agent of social facilitation in an everyday context (study 4)	121
5.2.1 Introduction	121
5.2.2 Method	122
5.2.3 Results	124
5.2.4 Discussion	125
5.3 Testing the robustness of the social catalysis effect (study 5)	127
5.3.1 Method	127
5.3.2 Results	128
5.3.3 Discussion	131
5.4 Summary of studies 4 and 5 on a dog as a social catalyst	133
Chapter 6: Pet ownership and enhancements to social networks (study 6).	136
6.1 Method	136
6.1.1 Subject recruitment	136
6.1.2 Instruments	137
6.2 Results	141
6.2.1 Size of social networks	142
6.2.2 Distribution of social relationship categories	142
6.2.3 Functional aspects of social networks	144
6.2.4 Effects of social support and pet ownership on psychological and physical health	149
6.2.5 Impact of pets on social networks	151
6.3 Discussion	157

SECTION 4 DIRECT CAUSAL ASSOCIATION	161
Chapter 7: Relationship focused explanations of direct causal association	162
7.1 Relationship focused mechanisms	163
7..2 Human relationships, social support and health	165
7.3 Pets as providers of supportive functions	167
Chapter 8: The role of pets in children's social networks (study 7)	171
8.1 Introduction	171
8.1.1 Children's social relationships	172
8.1.2 Children's relationship with pets	175
8.2 Method	176
8.3 Results	182
8.3.1 Test-retest consistency of subjects' selection of Top Ten lists	182
8.3.2 Inclusion of pets in the Top ten lists	183
8.3.3 Correlations of character rankings between sessions and between stories	184
8.3.4 Consistency of relationship choices across subjects in response to needs	186
8.3.5 Differential selection of relationships appropriate to need	188
8.4 Discussion	192

Chapter 9:	Relationships between young people with autism and their pets (study 8)	197
9.1	Introduction	197
9.1.1	Autism	198
9.2	Method	201
9.2.1	Recruitment	201
9.2.2	The interview	201
9.2.3	The subjects	202
9.3	Findings	207
9.3.1	Comparison of relationships with primary carers, nominated persons and pet	207
9.3.2	Behaviour of the pet	217
9.4	Discussion	218
Chapter 10:	The relationship between people with physical disability and their service dogs (study 9)	222
10.1	Introduction	222
10.1.1	Assistance dogs in the UK.	222
10.1.2	Benefits to recipients from the provision of a Dog for the Disabled.	225
10.2	Method	226
10.3	Results	227
10.3.1	Social integration	228
10.3.2	Close affectionate relationship	229
10.3.3	Dog as a provider of comfort, esteem and support	229
10.3.4	Enhancement of self-perceived health	230
10.3.5	Association between social integration, quality of relationship, supportive functions and self-perceived health.	230
10.3.6	General satisfaction with dog	231
10.4	Discussion	232

Chapter 11: Physiological approaches to a direct causal association	
between pet ownership and health	235
11.1 Introduction	235
11.1.1 Methodology	236
11.1.2 Terminology used in the studies.	236
11.2 Controlling for social catalysis and assessing	
perceptions of formality/importance (study 10)	242
11.2.1 Method	242
11.2.2 Results	246
11.3 Effect of dog compared to effect of music (study 11)	251
11.3.1 Method	252
11.3.2 Results	253
11.3.3 Discussion	264
11.4 Social support and physiological reactivity	267
 SECTION 5 SUMMARY AND CONCLUSIONS	275
Chapter 12 Summary and conclusions	276
 REFERENCES	287
APPENDICES	302
Appendix 1: Questionnaire for study 1	302
Appendix 2: Questionnaire for study 2	306
Appendix 3: Dispositional Resilience Scale used in studies 2 & 3	309
Appendix 4: Questionnaire for study 3	311
Appendix 5: Questionnaire and interview schedule used in study 6.	316
Appendix 6: Questionnaire for study 7	335
Appendix 7: Questionnaire for Study	338
Appendix 8: Materials for Study 10	343

Tables

Table 3.1:	Items in the Type A scale, and their loadings on the dimension underlying differences among the pet ownership groups.	67
Table 4.1:	Mean ratings of self- perceived health by pet ownership category and hardiness level.	81
Table 4.2:	Exercise frequency by sex and pet ownership.	83
Table 4.3:	Main affect means from ANOVAs on life choice ratings, adult sample.	86
Table 4.4:	Mean ratings of importance of a highly paid job by age group and pet ownership category.	88
Table 4.5:	Pearson correlations among life choice ratings and hardiness level (adult sample)	89
Table 4.6:	Mean scores for physical symptoms by sex and pet ownership group	96
Table 4.7:	Combined physical and psychological symptom scores by sex and pet ownership group.	97
Table 4.8:	Mean exercise frequency (0 to 5 scale) by current pet ownership.	99
Table 4.9:	Symptom scores by hardiness level.	100
Table 4.10:	Main effect means from ANOVAs on life choice ratings, student sample.	101
Table 4.11:	Number of subjects attaching importance to future pet ownership by current pet ownership status.	103
Table 4.12	Pearson correlations among life choice ratings and hardiness level (student sample)	103a
Table 5.1:	Frequency of interactions by condition and participant category.	125
Table 5.2:	Total frequency of interactions by condition and appearance of dog and handler.	129
Table 6.1:	Mean number of relationships by age and relationship category.	143
Table 6.2:	Summary of ANOVAs on support scores.	148

Table 6.3:	Correlations among negative affect and support variables.	148
Table 6.4:	Pearson correlations among psychological and physical outcome variables, relationship support and negative affect , and the presence/absence of a chronic health problem.	151
Table 6.5:	Relationships identified as being met/maintained through a dog.	153
Table 6.6:	Relationships identified as being met/maintained through a cat.	154
Table 6.7:	Relationships met/maintained through dog or cat by relationship functions.	155
Table 8.1:	Kappa coefficients showing consistency of children's selection of top ten relationships.	183
Table 8.2:	Correlations between relationship rankings for stories across test and re-test sessions	185
Table 8.3:	Consistency of subjects' choices of relationships in each story.	187
Table 8.4:	Mean ranks for nominated relationship, by stories	189
Table 9.1:	Behavioural features of autistic children's relationships with people and with their pets	208
Table 11.1 :	Summary of MANOVA in study 10	247
Table 11.2:	Phase (baseline / task) x condition (dog / no dog) interaction in separate MANOVAs for each combination of sex and task.	249
Table 11.3:	Summary of MANOVA in study 11	254
Table 11.4:	Summary of separate MANOVAs for each combination of task and order.	257
Table 11.5:	Items from the Stress Adjective Checklist	261
Table 11.6:	Correlations among adjective checklist component, state and trait anxiety, and reactivity measurements in the two tasks	263

Figures

Figure 1.1:	Schematic diagram showing an intervention reducing cardiovascular reactivity to a stress task.	20
Figure 1.2:	Example scenes used in Lockwood's (1983) experiment.	28
Figure 2.1:	Ainsworth's typology for adult human relationships from the perspective of attachment theory.	42
Figure 2.2:	Three classes of explanatory mechanism for an association between pet ownership and health benefits.	50
Figure 3.1:	Mean Overall Type A Score by pet ownership group.	64
Figure 4.1:	Predicted values of depression and illness for the interaction of hardiness with undesirable life change.	72
Figure 4.2:	Conceptual model of the relationships between hardiness, stress and health	73
Figure 5.1:	Mean number of interactions per 30 minutes by condition.	130
Figure 6.1:	Mean scores for emotional/esteem support by group and sex.	145
Figure 6.2:	Mean Affect/nurturance scores by age.	146
Figure 6.3:	Mean scores for social integration by sex and pet ownership group.	147
Figure 7.1:	The points at which social support may interfere with the hypothesised causal link between stressful events and illness	166
Figure 10.1:	Correlations between questionnaire items measuring social facilitation, affectionate relationship, social support and recipients' self-perceived health.	231
Figure 11.1:	A reactivity effect where intervention influences reactivity by influencing task levels but not baseline levels.	237
Figure 11.2:	A reactivity effect, but the intervention primarily influences baseline levels rather than task levels.	238

Figure 11.3: A main effect where intervention lowers both baseline levels
and task levels, but in this case it does not influence reactivity. 238

Figure 11.4: Mean levels of cardiovascular variables during baseline periods 259

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Finally, I should like to acknowledge the friendship, encouragement and the untiring support of Dr. Glyn Collis, without whose help I may well have abandoned it all and taken up basket weaving.

Declaration

The research presented in this thesis forms part of a larger research programme which is a collaboration between the candidate, Dr Glyn Collis and the Waltham Centre for Pet Nutrition.

Study 1 has now been published (McNicholas & Collis, 1998).

Study 4, 'A dog as an agent of social facilitation in an everyday context' was conducted by the candidate as an undergraduate project. Data are re-analysed for presentation in this thesis.

Study 5, 'Testing the robustness of the social catalysis effect', was designed by the candidate, data was collected by an undergraduate student and submitted as part of his final year elected research. Data are re-analysed for presentation in this thesis.

Studies 4 & 5 have been written up for publication in a paper entitled 'Dogs as social catalysts: testing the robustness of the effect', submitted to the British Journal of Psychology.

Study 6 is part of a research project designed by the candidate and supported by ESRC grant R022250014 under the ROPA scheme, awarded jointly to the candidate and Dr. Glyn Collis. Data were collected by a research assistant employed under this funding. The study has now been submitted for publication in the British Journal of Health Psychology in a paper entitled 'Could enhanced social networks explain the association between pet ownership and health?'

Study 7 "The role of pets in children's social networks' was designed by the candidate who supervised the data collection in two separate projects by undergraduate students. Data were combined and re-analysed by the candidate.

Study 8 has been submitted for publication as 'Relationships between young people with autism and their pets' in Autism.

Study 9 'The relationship between people with physical disability and their service dogs' has been accepted for publication in Applied Animal Behaviour Science.

Study 10 'Controlling for social catalysis and assessing perceptions of formality/importance' was designed by the candidate who supervised the data collection by two undergraduate students as part of their final year research. Data have been re-analysed for presentation in this thesis.

Study 11 'Effect of dog compared to effect of music' was designed by the candidate and conducted as a collaborative study with Orla Dunn, a Waltham/ESRC CASE student.

Summary

This thesis presents three classes of mechanism that may explain reported associations between pet ownership and health benefits. The first suggests any association is non-causal. Studies 1 - 3 examine candidate factors to explain both health advantages and likelihood of pet ownership. Type A behaviour was hypothesised to be associated with higher risk of illness and lower likelihood of pet ownership. Hardiness was hypothesised to be associated with better health and increased likelihood of pet ownership. Neither hypothesis was supported.

The second class of explanation suggests that pets indirectly effect health by acting as social facilitators of human-human interactions. Enhanced social contact may lead to health advantages. Studies 4 - 6 examine the robustness of the catalysis effect of pets and its impact on owners' social networks. Whilst the catalysis effect was found to be robust in generating social contacts, these were superficial and not regarded as providing relationship functions likely to enhance health.

The third class of explanation suggests pets have direct effects on health through the nature of the relationship with the owner, or through physiological effects such as reduced cardiovascular arousal to stress. Study 7 indicates that pets serve valuable supportive functions for normal children. Study 8 found that young people with autism demonstrate positive behaviours within their relationships with pets which they do not with people. Study 9 found the relationships between people with physical disabilities and their service dogs serve many supportive, as well as instrumental, functions and that this is associated with better self-perceived health. Studies 10 and 11 found no evidence that pet presence moderates cardiovascular reactivity to a laboratory stress task.

Little evidence was found of an association between pet ownership and health advantages, although it is clear that pets can be significant and valued relationships for their owners.

SECTION 1

INTRODUCTION

Chapter 1: The history of a belief

The relationship between humans and animals dates back in time to the roots of human civilisations, from the animals domesticated as beasts of burden, as food and for hunting and guarding, to the animals they preyed on and which preyed upon them. Regarded as necessities to ways of life, as currency, status symbols, sport and vermin, humans have attempted to control and shape the animals they chose to live with to suit their own purposes and linked them with beliefs and culture. Revered as gods, endowed with magical powers in some civilisations, feared as demons and witches in others, animals have suffered mixed fortunes in their shared history with human kind.

Viewed retrospectively, it is easy to find such beliefs primitive, even laughable. Yet beliefs about the effects of animals on the lives of humans continue today with little more evidence than existed for their roles in mythology, or as witches or gods. Some such beliefs *are* merely myths not quite discarded by our culture, despite our growing scientific sophistication. Black cats are good luck, a solitary magpie bodes ill fortune, the ravens must never leave the Tower of London for the fear of the country's safety from invasion - such beliefs are semi-serious, enjoyed as part of a folklore whose origins lie in a less enlightened, knowledgeable age. But folklore does not have to be ancient to take root in people's beliefs. A new belief has developed in Western cultures and, although few people know its origins, it has gained such widespread acceptance that it has found a place in modern health folklore - the growing belief that pets are good for one's health.

Far from being cloaked in ancient, partially discarded beliefs, this new belief is said to be based in modern scientific research, yet there are relatively few studies to substantiate this claim and even fewer explanations for how pets or any animals may enhance human health. The role of this thesis is to trace the origins of the claims, to critically evaluate the evidence, to put forward possible explanations for the reported

association between animals and enhancements to human health and to articulate a framework within which existing methodologies can be evaluated and new ones developed.

The use of the term 'health' needs early clarification. The popular belief is that pet ownership may promote physical health (reductions in blood pressure, for example) but research has rarely defined the use of the term. Rather 'health' has been used more broadly to also encompass psychological well-being which may arise from companionship, improvements in social integration or the alleviation of loneliness. Whilst health may quite rightly be seen as having both a physical component and a psychological component, studies have been rather unclear as to whether they are investigating physical health, psychological well-being or a combination of both, or how pet ownership may influence these factors. Instead, it is not uncommon for any sense of satisfaction or well-being derived from pet ownership to be interpreted as a potential health benefit. This can pose problems for evaluating whether pet ownership may truly have an effect on human health. For example, what should be the correct criteria for evaluating health? Objectively measurable benefits to physical health may seem the most obvious criteria but it would be too narrow to confine health to purely physical factors. Psychological well-being, as will be discussed later, is widely believed to foster resistance to physical responses to stress and anxiety and should be rightly regarded as a component of health. However, it is not always easy to distinguish elevated psychological health from the kinds of well-being reported in studies which may be more accurately viewed as improvements to quality of life which may produce a feeling of satisfaction but which may not impact on health.

In the context of this thesis, health is regarded as having both a physical and a psychological component. The discussion following the empirical work examines whether either (or both) may be legitimately claimed as being enhanced through pet ownership or whether the benefits that are derived may be more accurately described

as enhancing quality of life, as valuable but not necessarily evidence for health advantages.

The belief that animals can exert a positive influence on human health probably has its origins in at least two separable strands of research. Firstly, there is research into the use of animals with psychiatric or institutionalised populations, and, secondly, research based on the general population. The former may be viewed as being broadly divided into the role of animals as providing occupational resources, such as farming, for people in institutions, and the use of animals as a component in the treatment programmes of people receiving treatment for psychological or psychiatric disorder. Research into health benefits from animals among the general population may be similarly divided into research on the effects of animals not necessarily owned by subjects on people's physiological status and research on the association between personal pet ownership and health outcomes. The fact that claims for one strand of research have fuelled research into the other, and that their findings have been uncritically extrapolated from one to the other has led to a fusion, perhaps a confusion, of beliefs which frequently extend well beyond the empirical evidence. The claims that animals in some way contribute to human health are widely accepted, but tracing the origins of these claims, and their evaluation, requires the disentanglement of claims emanating from the two strands of research.

1.1 Animals and psychiatric populations

There is nothing new in the association between domestic animals and their uses for some people in need of health treatment. Working farms on establishments for the mentally ill became commonplace as a way of occupying patients, enabling them to fulfil useful roles and to contribute to the running of the establishment. In the 1750's, one notable early example of such a farm was that at the York Retreat, a residence for people with mental problems, run by Quaker philanthropists whose aim to promote

humane treatment for its patients stood in stark contrast to the asylums of the day. Patients were encouraged to tend and raise livestock, grow crops for home consumption, and to take active part in their own closed community. However, little is known about whether contact with animals the mental or physical health of the residents, and it is probable that working farms were little more than a convenient way of promoting humane care of patients and an economy for running costly institutions.

It was at least partially due to the success of such farms as the York Retreat, and the many which followed it, that a belief was established that certain people may benefit from work with animals, and the association between animals and benefits to 'special populations' persisted. In this context, animals were mainly those associated with farming - cattle, pigs, sheep, horses and poultry - but in the late 1960's and 1970's there came a change both in context and the type of animal - the use of animals regarded as pet species in the treatment of people with psychological disorder. This perhaps constitutes the first strand of research clearly contributing to the claim that animals can enhance human health.

Although Freud had earlier been reported to have had his chow-chow dog in his consulting rooms, it was through the work of Levinson, a psychotherapist, that pet animals began to play a part in the intervention procedures for children and adults with psychological problems. Levinson (1969) documents how the presence of his dog was of considerable value in building trust and alliance between his child-patients and himself in order to facilitate psychotherapy. The dog, it was reported, enabled positive initial contact between therapist and patient via casual conversation concerning the dog, whilst observations of the child interacting with the dog were of use in clinical diagnosis.

Throughout the 1970's, much of the focus of research was on the theme of the pet as a potential 'four-footed therapist', a beneficial adjunct to human therapists and a way of establishing a rapport with withdrawn or uncooperative patients for whom conventional therapy had little effect. Corson, Corson & Gwynne (1975) followed this theme with their work on in-patients in a psychiatric institution in one of the earliest experiments of Pet Facilitated Therapy. Despite the name, the animals used were not personal pets but species (dogs or cats) regarded as pets introduced into institutional settings. In one experiment, patients, selected on the basis that conventional therapy was proving to have minimal benefit in that they remained withdrawn and uncommunicative, were permitted to select a dog from a large number kept in kennels on the site of the hospital. They were encouraged to spend time with 'their' dog and to gradually assume responsibility for its grooming, exercise and well-being. Of the 50 patients in the program, Corson et al reported that 5 patients showed significant improvement, and only 3 failed to exhibit positive clinical responses. Improvements reported for these five patients included reality orientation, more social interaction and communication, co-operation with hospital staff, and generalised behavioural improvement. However, it should be pointed out that the claims rest heavily on the case studies of the five patients showing marked improvement (for some of whom pet facilitated therapy was an alternative to tube feeding or electroshock treatment), Corson et al do not report what, in their study, constituted a positive clinical response for the other 44 patients who, although responding to the animal therapy, did not show marked improvement. Today's evaluation of the study would be that it was interesting but inconclusive.

Brickel (1980), using resident cats in a hospital geriatric ward, also reported improvements in patients' responsiveness, as monitored by staff, first towards the cats, and then generalised to peers and staff. However, no quantitative data were presented, nor was consideration given of the environment or the patients' diagnosis

and additional treatment. For these reasons, like the Corsons' study, the results can be regarded as little more than anecdotal.

Despite the methodological shortcomings of these studies, they were influential in establishing a belief that continues today, that pet animals visiting institutions for special populations can have benefits in enhancing patient interest, communication and social interaction with others. Indeed, it is for just these benefits that the Pro-Active Therapy (P.A.T.) dogs are welcome in so many hospitals and residential homes today. However, although arousing patients' interest and enhancing interaction with staff may well contribute to overall well-being whilst in care, there seem to be no studies that can substantiate claims that this improves patient health. This is somewhat at odds with the reasons given for permitting visiting and residential animals since it is widely believed (and argued) that such animals can and do contribute to human health. This belief has its origins in another strand of research which did *not* focus on psychiatric populations and illustrates the results of fusing two strands of research and the generalising of findings from one domain to another. It is not uncommon to read papers that claim it has 'long been known' that pet ownership affords physical, emotional and social benefits, thus it is important to examine the benefits to psychiatric patients (Haughie, Milne & Elliott, 1992), or, conversely, that since it has been found that psychiatric patients that contact with animals affords such benefits so that it becomes important to investigate the role that personal pets have on their owners' health. Even researchers, it seems, are uncritical of the origins or applicability of the claims and later research into Pet Facilitated Therapy made free use of findings from growing research into animals and the general population.

1.2 Animals and the general population

Although most of the earliest work into animals and health concentrated on variations on the theme of Pet Facilitated Therapy for institutionalised/hospitalised populations,

there began to emerge a newer area of research - pets and people from the more general population. At first this took a hybrid approach, a focus on a 'special' population but which was not institutionalised or in need of treatment for the intervention of psychological disorder. One study which was to have a major influence and become frequently cited was a study conducted by Mugford and M'Comisky (1975) who investigated the role of pet budgies on the physical and psychological well-being of older people living alone. Claims from studies into the role of pets in the care and treatment of psychiatric patients were utilised as a foundation for the study, especially the claims that animals provided a sense of usefulness and being occupied, and companionship through a relationship that has no personal agenda nor expectations to be fulfilled.

A sample of older people, living alone, were recruited to the study and arranged into five experimental groups. Groups 1 and 2 owned televisions whilst groups 3 and 4 did not, and group 5 (the control group) was made up of equal numbers of subjects who owned or did not own televisions. It was expected that a pet budgie would assume less significance to subjects who owned televisions than to those who did not since television may be regarded as providing 'a degree of interaction between those who live alone and the wider society'. Groups 1 and 3 were given budgies whilst groups 2 and 4 were given a small house plant to care for. Group 5 received neither budgie nor plant. All subjects were interviewed and a 30 item questionnaire relating to attitudes towards other people, towards self and towards physical and psychological health was administered verbally at the start of the study and at its conclusion five months later.

It was reported that whereas television ownership had no significant effect on the questionnaire responses, there was a significant and consistent positive effect in the groups to whom a budgie had been given when compared to the plant owning subjects. Such findings were widely regarded as demonstrating the role pet animals could play in enhancing the lives of older people. The authors particularly emphasised

the effect of the budgie in providing a topic of conversation, a focal point for communication with friends, relatives and visitors. This ability of a pet to enhance communication was referred to 'social lubrication' and was seen as having similar value as the improvements to communication brought about by the Pet Facilitated Therapy programs for the withdrawn patients in institutionalised populations.

Although the study had a highly influential effect on research and beliefs of the time, it is not without its flaws. Examination of the data show that some 40% of the subjects dropped out of the study for a variety of reasons. To compensate for this, the authors calculated a comparison of the groups from responses given at the start of the study rather than the responses collected at the end of the study. This casts doubt on the validity of the findings. Given that it is also reported that some subjects refused to take a budgie for reasons that they did not want the trouble, or found cage birds upsetting, noisy or messy, it should also be asked whether this constituted an unintentional form of subject selection whereby only those subjects who already had positive attitudes to themselves, their health, and their ability to cope with change or novelty, accepted the budgie in the first place.

Although such criticism must surely have been made at the time (although I am unable to locate any) it would appear that the findings were widely accepted and, twenty years on, the study remains much cited as a source of evidence that animals can positively influence health and well-being. In fact, the study may well have marked a turning point in the direction of research. Not only did it make the transition to subjects drawn from a non-institutionalised population (albeit not typical of the general population), it also made the transition to from visiting animals to personal pets. In addition, it attempted to offer some form of explanation for the reported outcomes, firstly through its description of the role of the pet as a social lubricant facilitating interactions between the owner and other people and, secondly, through the descriptions of the affectionate relationship with the budgie and the

companionship it afforded. Whilst these are not so different from the explanations offered by psychotherapists, except in the use of non-psychodynamic terminology, they constitute a first attempt at asking the 'what, how and why' questions that need to underlie serious scientific research. In retrospect it is easy to criticise the study for not going far enough into its explanations, for not trying to examine how either social lubrication or an affectionate, responsive relationship may enhance health. However, at the time of the study, research into relationships, social networks and health was still in very early infancy and it is probable that the current state of knowledge precluded such questions being framed, let alone addressed.

Although the Mugford and M'Comisky study had great impact amongst those interested in human-animal studies, it was not until the 1980's that research began to have widespread impact - to the point where the belief that pets could be beneficial to health has almost entered health folklore. The main impetus for this was the switch in the focus of research to pet ownership, rather than pet contact in therapeutic situations, and more importantly, claims for health outcomes began to be made for the general population rather than specific patient populations. Much of this must be attributed to the work of Friedmann, Katcher, Lynch & Thomas (1980) in their research on the recovery and survival rates amongst patients who had suffered myocardial infarction or angina pectoris.

In a study to evaluate possible predictors of one year survival in cardiac patients, pet ownership was included in an inventory of social factors (age, social affiliation, socio-economic status, employment, geographical mobility and living situation). Data regarding psychological mood status was obtained via an adjective checklist, and the physiological severity of the illness was rated. The one year survival rate in the sample of 92 patients followed up was 84 %. Only 3 of the 53 pet owners had died. In contrast, 11 of the 39 non-pet owning patients died within one year of the illness. The possibility that this may have been due to the increased activity levels that could be

expected by dog owners was discounted by further analysis excluding dog owners which upheld the relationship between pet ownership and one year survival. Physiological severity of the disease, as would be expected, significantly correlated with mortality as did the age of the patient. Pet ownership did not correlate significantly with physiological severity.

The findings were widely reported in the popular press and, even today, the study is perhaps one of the most cited and widely known of all work in the field of human-animal studies. However, the study contained many inaccuracies and was heavily criticised for statistical error and errors in interpretation (Wright & Moore, 1982). In particular it was pointed out that, when all other social factors were examined along with physiological severity and pet ownership, the standardised discriminant function coefficient for pet ownership was 0.12, the least important variable of the eight under analysis for the prediction of survival. The bivariate relationship between pet ownership and survival could, therefore, be accounted for by one or more of the seven other variables. Although not pointed out by Wright and Moore, there are other grounds for criticism of the study. Whereas age of the patient was significantly correlated with mortality and with psychological severity, no data was presented for the relationship of pet ownership with age - which could be expected to influence pet ownership. Nor did the health status of the patient prior to the onset of angina pectoris or myocardial infarction (which could also be expected to influence pet ownership) appear in any of the analyses.

In an invited response from the authors, Friedmann and Katcher (1982), acknowledged the errors in their statistical analysis but failed to address adequately the comments that pet ownership could be viewed as a relatively trivial contribution in the set of variables discriminating survival status. Rather they placed heavy reliance on a Chi-square table of frequencies on mortality of pet owners and non-owners to assert the independent influence of pet ownership on survival. Such a table

reflects the bivariate correlation between pet ownership and survival and does not account for any of the remaining seven social factors referred to by the critics.

However, even the authors acknowledged that the findings of their study "have been exaggerated and over-interpreted" and that they do not assign causality of pet ownership to survival of patients.

Notwithstanding the criticism and the denial of attribution of causality, the study has continued to be the most widely cited reference for claims of the beneficial effects of pet ownership on human health. Its immense impact on research is undeniable as was its impact on views of pet ownership amongst the general population. The belief that pets were somehow good for people began to gain widespread publicity and relatively uncritical acceptance.

Research in the 1980's and through the early 1990's took on new impetus in its search for health related outcomes from pet ownership. There are at least three discernible forms of research at this time. One area of research remained more affiliated to the earlier research on 'social lubrication' and examined how pet dogs could facilitate social interactions between people. Work in this area did not directly relate its findings to health outcomes and, on the face of it, appears to stand as an 'aside' in the general trend of research of the time. In fact, as will be argued later, this area may be seen as potentially having an important bearing on the question of whether and how pet ownership can lead to favourable outcomes. Friedmann and her colleagues continued to examine physiological factors that may arise from contact with pets and which may have some influence to cardiovascular health, giving rise to a body of research focusing on indices of blood pressure and heart rate when interacting with or watching an animal. This work was complemented by other researchers also measuring physical and/or psychological factors that could arise from pet ownership and which might have positive influence on health. Prominent amongst these were

researchers concentrating on the relationship between owner and pet as a method of assessing and explaining how it may contribute to health.

1.3 Pets as social catalysts

Probably the first study to directly concern itself with the way a pet may have some direct influence on the social content of its owners life was that conducted by Messent (1982) who studied dog owners walking in a London park with and without their dogs. He found that, when accompanied by their dog, his subjects experienced a significantly higher number of chance conversations with other park users than when walking the same route without their dogs. Moreover, the conversations were significantly longer when their dog was present. As a part of the same study, observations were made of all park users on two dates. Messent's results indicate that users accompanied by dogs experienced the highest number of spoken interactions (42.7% on one date, 33.6% on the second observation date) of all park users. Only 2.8% and 4.7% of users without dogs (and presumably alone) experienced any observed spoken interaction. Park users with a child in a pram fared little better (7.6% and 4.8%) although users with both a child in a pram and a dog were observed to experience the most spoken interactions (42.9% and 60% for the two dates).

A number of later studies also took up the theme of pets, especially dogs, as acting as social catalysts. In the main, the focus reverted to 'special populations' such as people with disabilities rather than the general population, as used in Messent's study, since it was thought that enhanced social interaction would have special benefit to people at risk of comparative social isolation. In this way, such studies bore as much resemblance to Mugford and M'Comisky's work as they do to Messent's.

Two such studies investigated the effect of service dogs on the social acknowledgement of their handlers. In a retrospective study Hart, Hart and Bergin

(1987) examined the number of friendly interactions experienced by adults with physical disabilities before and after receiving service dogs. Subjects reported a favourable increase in friendly approaches from other (able bodied) people after getting their dog compared to times before they had a service dog. A later study (Eddy, Hart and Boltz, 1988) directly observed the behaviour of people passing disabled adults with or without dogs on the same route in a city. It was observed that there was a four-fold increase in social acknowledgements for those people with service dogs as compared to subjects with out dogs. A similar study on children with disabilities with and without service dogs was also conducted (Mader, Hart and Bergin, 1989) produced results comparable with the earlier studies. Children with physical disability were more likely to experience favourable looks, smiles and conversations with others when accompanied by a service dog than children with no service dog. A further study by Hart on the effects of Hearing Dogs (personal communication) confirms that the social catalytic effect of these service dogs, too, is strong and may well be at least as valuable to the owners as a facilitator of social interactions and a means of social integration as the work for which the dog is specifically trained.

A few studies have examined the role of dogs in eliciting casual conversations between people in subjects without disability. Rogers, Hart and Boltz (1993) reported that elderly people residing on a mobile home park and who owned dogs took twice as many daily walks than those who did not own dogs, and that passers by talked to dog owners about their dogs whether they were present or absent, presumably since the subjects were known by others to be own dogs. Dog owners were also reported to be significantly less dissatisfied with their social, physical and emotional states as measured by the Older Americans Resource Survey (1978).

Although there has been little work on other pets as social catalysts, it would at least seem that dogs can act as extremely effective social facilitators, enabling social

interaction between people that may not otherwise occur. That researchers have, for the most part, decided to focus their attentions on disabled or elderly subjects is perhaps understandable since these people are at most risk of social isolation and therefore most likely to attain benefits through enhanced social interaction. However, there has been a significant lack of research into the role of dogs, or any pet, as providing social facilitation to owners more typical of the general population, so it is unclear whether such pronounced findings would be discernible for typical pet owners, or what benefits might accrue if they were. Messent's study, although demonstrating a significant increase in social interaction for people walking dogs, does not report who talked to whom. In parks, it is quite normal for dog owners to greet each other or to strike up conversations about their dogs simply because they are recognisable as sharing a common interest and pastime. Perhaps the interactions are initiated by the dog owners themselves, or by the attention provoked by the dog from passers by. The study ignores these possibilities yet, if dogs are to be regarded as social catalysts, it should be established that they, and not the owners, are responsible for the occurrence of social interactions. Similarly, the results would not warrant general claims that dogs enhance social interaction if it were found that these were confined to greetings to other dog owners only.

Studies into the socialising influence of service dogs may help to clarify some of these issues. Service dogs are unlikely to solicit attention themselves since they are trained to not to do so. It is also clear from the studies that greetings and contact with passers by was not confined to owners of dogs, service dogs or otherwise. However, no mention is made of whether the dog owners themselves reacted differently whether or not they had a dog. It is possible that the increased pleasure and confidence in owning a dog trained to assist people with disability may produce sufficient confidence in their owners that they initiate contact, smile or make eye contact with passers by.

Despite these ambiguities, it does appear that for some populations, the socialising effect of a dog is a robust phenomenon. However, it is a larger step to make claims for health enhancement as claimed by the study by Rogers et al. Although subjects did indeed report less dissatisfaction (and perhaps this is distinguishable from more satisfaction) with their social, emotional and physical states, the study provides no clear evidence that this emanates from owning a pet. It may be just as likely that those people were motivated to own a pet *because* they enjoyed better physical or psychological health.

A further question remains unanswered. It concerns the assumption that was becoming implicit throughout much of the research into the effects of companion animals on health and well-being, that animals have 'special abilities' over and above other objects, hobbies or activities. In the context of the social catalytic effect of animals, only one study has appeared to test this. Hunt, Hart and Gomulkiewicz (1992) conducted a study in which an experimenter sat in a park accompanied by either a tortoise or a rabbit (in the animal conditions) or watched a small television or blew bubbles. The number of interactions from adults and children using the park was recorded. The experimenter experienced fewest interactions with both adults and children when sitting alone with a television, perhaps because this would seem to be a solitary activity. Most adult interactions were attracted by the rabbit, with none being recorded for the presence of the tortoise. Children, however, were most attracted by the bubble blowing with three times as many approaching the experimenter in this condition than in either the tortoise or rabbit condition.

The experiment is perhaps rather bizarre in that it utilises conditions which would not commonly occur in parks. It does, however, demonstrate that chance interactions between strangers are more likely to occur when there is a clear focus of attention. As Goffman, 1977; cited by Veevers, 1985) has pointed out, " a woman who carries on her or with her a camera, a dog, a book or almost any object is providing reasons a

stranger can use as a basis of initiating a comment to her". This need not, it seems, be an animal. However, Hunt et al assert that "what is unique about an animal is that it makes it possible for a person to attract people who then initiate conversations". Such a claim would certainly appear to extend well beyond the evidence of their own study. Animals may provide commonly encountered reasons for interaction; they may be 'safer' in that talking about a dog is not intrusive or threatening, but it seems very unlikely that they are unique in this respect.

Studies into the social catalytic effect of animals generally stop short of presenting the findings as evidence of health promoting factors associated with pet ownership.

Animals, it was claimed, could enhance owners quality of life by providing opportunities for social interaction. In hindsight it is unfortunate that this was not extended to investigate the consequences of increased social contact, such as the making of friends or the building of relationships, that may well have had an impact on human health. Rather than explore this issue directly, most studies subsequent to Messent's original investigation made frequent reference to work conducted in other areas of companion animal research, notably studies examining physiological responses to animals and the nature of the relationship between animal and owner. In contrast, these other kinds of studies were less inclined to cite studies demonstrating catalytic effects of animals or to incorporate them into any interpretation of their findings. Research into social catalysis remained, and still largely remains, somewhat set apart from other foci of research. It will be argued later that this was unfortunate since this work has a potentially important role in the bringing together a coherent framework of how and why pets may have influence on their owners health.

1.4 Effects of animals on human physiology

Friedmann's study into the one year survival of patients with cardiovascular disease prompted a body of research investigating potential physiological explanations for the

apparent protective effects of pet ownership. Since stress is widely believed to be a contributing factor in the development or onset of cardiovascular disease, it was hypothesised that pets may be able to act as stress reducers by moderating the body's physical responses to potentially stressful situations and/or providing opportunities to dissipate stress responses quickly.

Early work in this area examined how the presence of an animal may 'defuse' perceptions of situations that could provoke anxiety. Sebkova (1977; cited by Friedmann, 1995) administered psychological tests to subjects in a high stress situation (a laboratory) and a low stress situation (the subject's own home). Each subject was tested twice, and in one condition for each subject the experimenter was accompanied by her own dog. Levels of anxiety experienced were recorded via scores on a psychological checklist and by observation of unspecified anxious behaviours by the subjects. It is reported that in both the high stress situation and the low stress situation, self reported anxiety and observed anxiety were significantly lower when the experimenter was accompanied by her dog. Moreover, greater attention was paid to the dog in the high stress situation, which was interpreted as lending support to the hypothesis that its presence afforded a 'relaxing external focus of attention or feelings of safety' (Friedmann, 1995).

A further experiment on whether animals may affect perception of stressful situations was carried out by Lockwood (1983) in which, rather than have a real animal present during the testing, subjects were required to view various scenes modelled on the Thematic Apperception Test card model and rate these using a list of adjective pairs. One set of test cards contained scenes of people only, whilst a second set showed the same scenes but with the inclusion of one or more animals in the scene. Lockwood reports that the scenes in which animals were included were rated as significantly more friendly, less threatening and happier than the scenes without animals.

The two experiments were taken to confirm that animals can successfully avert the perception of a situation as stressful (Friedmann, 1995). The validity of this interpretation is discussed later, but the combined results provided a foundation for research into the physiological mechanisms that may underlie such decreases in potential stress perception and, in particular, investigations into pets as 'anti-arousal' agents.

In the main, this area of research focused on whether pets can directly reduce physiological or psychological responses to a stressor by conducting laboratory experiments in which subjects are exposed to the mere presence of a friendly animal or are permitted to interact with an animal. Using automated blood pressure monitoring devices it is possible to record changes in heart rate, blood pressure and mean arterial pressure over a period of time so as to assess arousal caused by an experimental task/stressor and to detect changes, if any, due to the presence of an animal.

The first study which claimed to demonstrate a reduction in cardiovascular responses to a stressor through the presence of a companion animal was that conducted by Friedmann, Katcher, Thomas and Lynch (1983). They investigated changes in the heart rate, blood pressure and mean arterial pressure of children (aged 9-15) when resting quietly and reading aloud. A friendly but unfamiliar dog was present either at the start of the experiment, being removed halfway through, or was introduced during the second half of the experiment. No interaction with the dog was permitted and all trials took place in a home setting. Using a Dinamap oscillometric monitor, blood pressure, heart rate and mean arterial pressure were recorded at one minute intervals during the experiment.

The results showed that the experimental task produced significant increases in all cardiovascular measures, as could be expected. The presence of the dog produced

significant reductions only in blood pressure, but this was confined to a main effect, that is, it derived from both resting and task periods. There was no significant interaction between the rest/task factor and the dog present/absent factor to suggest that the presence of a dog reduced the level of stress or arousal in subjects' *in response* to the task. The cardiovascular response to a stress task, or *reactivity*, is the extent to which cardiovascular variables change from baseline to task (figure 1.1). Thus the results of the experiment did *not* support the hypothesis that pets could reduce cardiovascular responses to a stressor. However, in spite of these non-significant findings, the reported discussion referred to lowered blood pressure and heart rate and interpreted the results as if a reduced reactivity response had been found. This was erroneous and is likely to have influenced both popular reporting and subsequent research in the area.

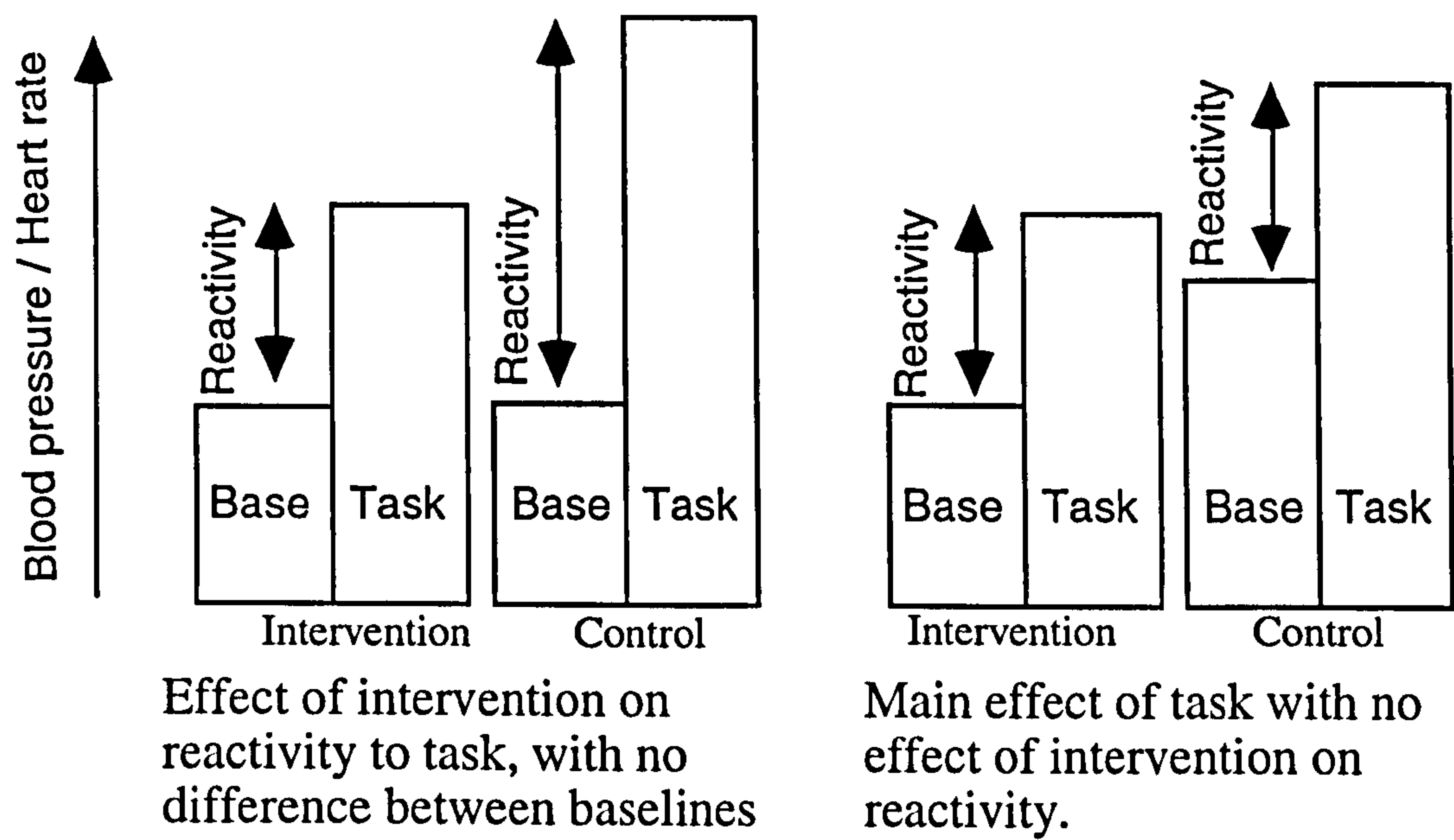


Figure 1.1: Schematic diagram showing an intervention reducing cardiovascular reactivity to a stress task (left). The diagram on the right shows a main effect of the intervention in the absence of effect on reactivity.

As an a example, Locker (1985), modelling her study on Friedmann et al's design, conducted an experiment on 129 college students to investigate whether presence of a

dog would reduce cardiovascular responses to a stress task. In addition to blood pressure and heart rate measures, Locker incorporated a personality measure (Type A and Type B) into the design since Type A personalities are widely believed to exhibit greater cardiovascular reactivity to stress, this being one element in the reported vulnerability of Type A personalities to cardiovascular disease.

A Multivariate Analyses of Variance (MANOVA) revealed that the dog's presence had no significant effect on any of the cardiovascular variables under investigation, nor any effect on reactivity to the stress task. In spite of the lack of significant findings, Locker went on to analyse the main effects of the dog present conditions separately in each of the four cardiovascular variables. It was found that only heart rate differed significantly between the dog present/absent conditions, being lower when the dog was present. Results regarding personality type were not reported.

These findings do not compare with those of Friedmann et al's study in which heart rate was not significant but which did show a difference in blood pressure. However, the two experiments do illustrate two issues emerging from research in the area. Firstly, both experiments used unfamiliar dogs. This raises the question of whether it could be expected that an animal with whom no relationship could be expected to have an effect. Secondly, whilst Friedmann's study took place in a home setting, Locker's was conducted in a laboratory. It could be argued that a laboratory setting may impose particular stresses on subjects, or that it is too artificial an environment in which to study responses to minor stresses.

Later studies began to address these issues. Grossberg, Alf and Vormbrook (1988) investigated subjects' reactivity to stressors in a laboratory setting but whilst accompanied by their own dogs. Since removing a subject's own dog could be problematic or of concern to subjects, the experiment was necessarily a between-

subjects design, unlike Friedmann et al and Locker who used a within-subjects design where subjects were exposed to both dog present and dog absent conditions.

After a preliminary six minute baseline period in which pre-task measurements of blood pressure and heart rate were taken at two minute intervals, Grossberg et al requested subjects to complete two maths tasks and two thematic apperception tasks with rest periods between. Although neither the Friedmann study nor the Locker study had found any significant reduction in reactivity to a stressor in the dog present conditions, Grossberg et al's experiment was entirely focused on this and they analysed their results in terms of a reactivity response, thus no main effects are reported to enable comparison with the two earlier studies.

The results showed no significant differences in reactivity levels between the dog present and dog absent groups in response to any of the tasks, indicating that even a subject's own dog did not produce the anticipated reduction in cardiovascular activity required to support the hypothesis that pets could reduce stress in ways beneficial to health. At least two explanations for these finding were forwarded. The first focused on the small sample size of 32 subjects, all of whom were young, normotensive and drawn from a student population. The second explanation was that subjects may have been concerned about the behaviour of their dogs when visiting a laboratory and that this may have negatively influenced any potential reductions in cardiovascular responses to the stress tasks.

Although the three experiments of Friedmann et al, Locker, and Grossberg et al had produced rather conflicting results, and none of them had found evidence to suggest that the presence of a dog had any significant effect on the reactivity to a stressor, the belief that animals could exert a stress reducing influence persisted both in popular perception and in subsequent experiments. Allen, Blascovich, Tomaka & Kelsey (1991) conducted an experiment to compare subjects' cardiovascular responses to a

stressor in the presence of their own dog, a human friend or alone apart from the experimenter. It was hypothesised that the presence of a subject's own dog would be more likely to reduce reactivity to a stressor than the presence of a human friend. The hypothesis was based on the assertion that pets could provide a valuable source of social support at times of stress and that this support, unlike that of a human friend, contained no evaluative component which might serve to increase stress levels if the subject felt that his/her competence or esteem were threatened in the eyes of their friend. The conceptual base of this experiment is discussed in more detail later (chapter 11), here the purpose is to outline the results of the experiment.

Forty-five female dog owners were recruited to the study. The experiment had two stages, the first stage being conducted in a laboratory, with only the experimenter present, and the second stage in the subjects' own homes. In the second stage the subjects were divided into three groups, one third being tested with only the experimenter present, one third with the subjects' own dog present, and the remaining third with a human friend present. The variables measured were pulse rate, galvanic skin conductance, systolic blood pressure and diastolic blood pressure. A 15 minute baseline was conducted to allow stabilisation of measurements at pre-task levels. The tasks were two mental arithmetic tasks, each lasting two minutes, with two rest periods between tasks.

All subjects were tested in the laboratory first with only the experimenter present. Results showed no significant differences between subjects for any of the dependent variables under examination, indicating similar levels of cardiac activity for all subjects under the same condition. In the home setting, however, subjects did demonstrate significant differences in reactivity to the tasks according to which group they were assigned. Subjects tested with their own dog present showed significantly lower reactivity to tasks than subjects who were alone with the experimenter. Reactivity for this control group was also significantly lower than for the group who

had a female friend present. These differences were confined to only two of the dependent variables, skin conductance and systolic blood pressure, and not for pulse rate or diastolic blood pressure.

The experiment was the first to report a reactivity effect to support the assertions that the presence of a pet could reduce cardiovascular responses to a stressor, at least in a home setting. However, later studies have produced mixed results. Rajack (1996) tested the cardiovascular reactivity to three stressors in 58 female subjects in their own homes. The subjects were 30 dog owners, tested with their pet present, and 28 non-owners, tested with only the experimenter present. the three stressors were the sound of an alarm clock ringing unexpectedly, running up and down a flight of stairs, and reading aloud. There were no significant differences in subjects' reactivity to either the stair task or to reading aloud. However, differences in reactivity were found in subjects' responses to the sound of the alarm clock. Dog owners had significantly lower increases in heart rate as compared to non-owners (increase in heart rate to sound being 6 beats per minute in non-owners and 4.1 beats per minute for dog owners). This effect was most pronounced in subjects who took regular exercise. Since regular exercise is widely believed to be beneficial for cardiac health, and dog owners may be more likely to take regular exercise, this effect may be more connected with exercise taking than the presence of a dog.

A further study by Allen, as yet unpublished, examined the reactivity to three stressors (mental arithmetic, a cold pressor test and a reading task) in 240 married couples, half of which were dog owners. Subjects were divided into four groups; tested with experimenter alone; with pet dog; with spouse plus their dog (or a friend for non-owners) and with spouse only. Preliminary results indicate that lowest reactivity was found in the group tested with their pet dog, and highest reactivity in the group with their spouse present.

In summary, the experiments to date show mixed results with only one published study reporting a significant effect in reactivity. Later studies than Allen et al's have continued to fail in their attempts to identify moderating effects of a dog's presence on either heart rate or blood pressure during a stress task. Moody et al (1996) also failed to find any moderating effects of a dog present during a stress task, and Straatman, Hanson & Endenberg (1997) found no significant differences in state anxiety blood pressure levels or heart rate during a stress task in male subjects who had a dog present during the task and those who did not. The task did, however, produce significant increases between baseline and task levels, indicating that the procedure was sensitive enough to identify moderations in the dog condition had they been apparent. The evidence for pets as agents for reducing stress via reduction of physiological arousal is therefore slim and the effect seemingly lacking in robustness.

Another strand of research taking place at this time focused on the contrast between petting an animal and engaging in other activities such as resting and reading. Although using similar physiological variables, the aim was not to investigate possible stress reduction but rather to compare measures of relaxation achieved. However, the interpretation of two strands of research became linked, even confused, in their reporting.

Grossberg and Alf (1985) investigated blood pressure, heart rate and mean arterial pressure when subjects were resting, reading aloud, petting a dog and engaged in casual conversation. It was found that petting a dog produced lower readings in these physiological variables than reading aloud or conversing, but *not* significantly lower than just resting quietly. Wilson (1987) contrasted reading aloud, reading quietly, petting a dog and resting. Petting a dog was found to produce higher readings for blood pressure and heart rate than reading quietly, although Wilson claimed, in her discussion, that 'petting a dog has a parallel relaxation effect to quiet reading'. The comparison between resting and petting a dog was not reported. Nonetheless,

evidence from these and similar studies was regarded as strengthening the assertion that pets could have beneficial effects on physiological systems that could be beneficial to health.

The results, however precarious, of such experiments had immense popular impact. It became 'common knowledge' that stroking a pet could lower blood pressure, or that watching aquaria was 'relaxing'. However, a number of issues have yet to be addressed if the findings can truly be taken to provide evidence that animals act as stress reducers. Firstly, notwithstanding that animals appear to be able to 'defuse' a laboratory stressor, it is unclear whether this may generalise to stressful situations outside a laboratory. The studies appear to assume that, if people own pets, they will have more access to animal contact and therefore the potential to reduce stress, However, there is little, if any, evidence from the studies to suggest that animals are typically present at the time of 'real' stressful situations or that owners use their pets as stress reducers. Secondly, the question arises whether the stressors used in the experiments accurately reflect real life stressors. Reading aloud, mental arithmetic or casual conversing may not bear much resemblance to stressful events in the real world. Thirdly, although statistically significant, the observed reductions in cardiovascular measures are very small and short term, and it remains controversial whether such short term reductions can be translated into longer term and/or more frequent reductions outside the laboratory (Stephoe) and it is debatable whether such reductions in blood pressure and/or heart rate, even in the laboratory, are sufficient to bring about health benefits, cardiovascular or otherwise. Fourthly, results of the studies were once again popularly taken to imply that animals had particular or unique capacities to achieve these effects despite a lack of supportive evidence. This was probably never intended by the researchers but it is nonetheless remarkable that so few studies (and none which examine reactivity levels) have been conducted into the comparative effectiveness of animals as compared to other activities, perhaps

meditation, listening to music, or engaging in some chosen form of relaxation such as painting or drawing, that would have lent themselves easily to experimental scrutiny.

In spite of the studies demonstrating reduction in physiological responses that *could* have an effect on cardiovascular health, it has not adequately been shown that they do in fact have such an effect. The results may be due to some factor other than the dog which may not be generalisable to real stressful situations. For example, in the Sebkova experiment, it is not reported whether the experimenter and subject engaged in increased social interaction when the dog was present (e.g. introducing the dog, talking to it, talking about it) thus introducing an effect of social catalysis and the establishing of a rapport between experimenter and subject that would not have occurred in the condition where the dog was absent. Alternatively, the fact that a dog was permitted to be present may have led to the subject believing the experiment to be relatively non-serious. Although this latter possibility would be an illustration of how the situation may have been 'defused' by the dog it is not attributable to the 'relaxing external focus' or the 'feelings of safety' as ascribed by Friedmann. Rather it would be more attributable to the subject perceiving the task as non-important, unprofessional or just peculiar, and would not be generalisable outside that task context.

Examination of some of the scenes used in the Lockwood (1983) experiment suggests that the inclusion of an animal may well have resulted in more favourable adjectives ascribed to them simply because the animals gave extra meaning to the scenes and provided subjects with descriptions which would not have been threatening or negative. Example scenes are shown in Figure 1.2. One scene depicted a man alone, sitting slightly hunched on a park bench. The picture is ambiguous - he may be sad, thinking, alone, stood up by date or perhaps just waiting for someone. With the inclusion of three birds, a squirrel and a bag in his hands it is clear that he is feeding the animals, and the implication is that he does so because he likes to. Similarly, a

picture of a man facing a woman who is leaning against a post or tree trunk is ambiguous. They may be strangers or acquainted; the interaction could be positive or negative since nothing is revealed in their expressions. However the inclusion of a dog on a lead being held by the man gives instant meaning to the picture. He is engaged in the innocent pastime of walking his dog and has stopped to talk with the woman. The positive responses to animal inclusion may not be due to the animals presence *per se* but to the absence of ambiguity.

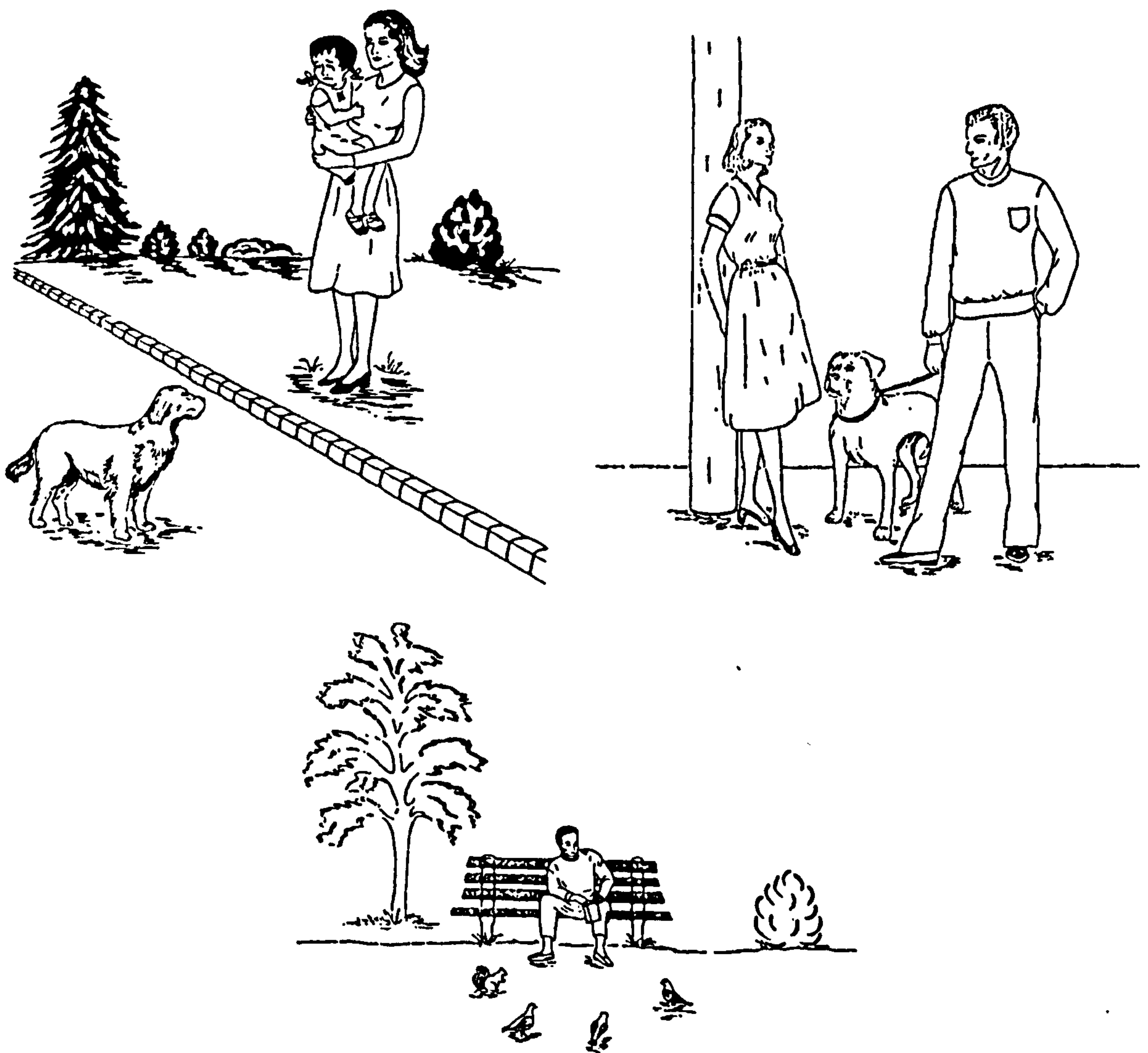


Figure 1.2: Example scenes used in Lockwood's (1983) experiment.

The experiments investigating physiological responses to stress placed considerable reliance on both the Sebkova and the Lockwood studies. Perhaps the foundation is less reliable than at once believed. The experiments are also subject to the same questions as those raised in the discussion of the Sebkova work. Did subjects take the view that the experiment was less important because a dog was permitted to be present, or was there increased social interaction in the conditions where the dog was present? Are dogs present in the context of everyday stressors? If so, do they have the same kind of effect in reducing physiological responses as are found in the laboratory? Most importantly, do pet owners in the general population exhibit health advantages. Such issues require addressing if the studies are to be regarded as providing evidence that physiological responses to stress may be one mechanism through which pets can contribute to human health.

1.5 Pet ownership and health in the general population.

Two major studies of the 1990's attempted to address the question of health advantages in pet owners in the general population. Taking place at approximately the same time at different sides of the world, the two studies marked a switch back to investigation of pet ownership and health. One study by Anderson, Reid and Jennings (1992) followed the theme set by Friedmann and concentrated on exploring the apparent link between pet ownership and benefits to cardiovascular health. In a study of 5741 people voluntarily attending a free screening clinic in Melbourne, Australia, accepted risk factors for cardiovascular disease were compared for pet owners and non-owners. Blood pressure, plasma cholesterol and triglyceride values were recorded for each subject, and pet ownership was included in an inventory containing demographic details and a self-assessment of smoking habits, alcohol consumption, dietary habits, family history of heart disease and exercise habits. Of the 5741 subjects 784 (13.6%) owned pets. Across both sexes, pet owners were found to have significantly lower systolic blood pressure and plasma triglyceride levels. In

men aged between 20 and 59 years systolic blood pressure, plasma cholesterol and plasma triglyceride levels were significantly lower for pet owners than for non-owners. Diastolic blood pressure did not differ significantly between male pet owners and non-owners in any of the age groups. For female subjects, there were no significant differences between pet owners and non-owners in any of the levels except systolic blood pressure in women aged over 40 years.

Pet owners reported themselves as significantly more active than did non-owners, which could be viewed as an obvious health promoting factor, but also reported themselves as drinking more alcohol, eating more 'take away' foods and more meat than non-owners. Cigarette smoking, salt and egg consumption were similar for both subject groups.

The study has done much to promote the belief that pets ownership is associated with reduced risks for cardiovascular disease. However, the study does not indicate whether the reductions recorded in the measured variables would be sufficient to reduce risks, which is somewhat surprising since the authors are routinely engaged in assessment of risk for cardiovascular disease. Also, it is puzzling that only 13.6% of subjects owned pets. This seems rather a small proportion when compared to ownership in similar age groups in the UK. Whether this indicates that pet owners are less likely than non-owners to voluntarily present themselves for risk screening is unclear, but it cannot be ruled out that there may be undetected factors influencing why some people choose to attend and others do not. One possible explanation could be that people who believe themselves to be at risk, perhaps due to high pressure jobs or lifestyles, are more likely to attend screening clinics but, because of their commitments or worries about their health, are less likely to own pets.

A further problem with the study is in its designation of pet ownership. No data are presented for whether those subjects who identified themselves as owning a pet did so

on the basis of merely having an animal in the house in which they resided, and which they may have no real involvement with, or whether they regarded themselves as pet owners through having a particular animal which they regularly engaged in some activity or contact. Although the study did not attempt to offer any explanations for its findings, the absence of this information is likely to hinder later attempts to identify the mechanisms which may be operating to bring about the apparent benefits to cardiovascular health. As it stands, the explanation could lie through increased exercise, stress reduction via the physiological mechanisms proposed by Friedmann, increased recreational contact via social catalysis, or through the relationship with the pet itself.

The second major study of the 1990's was conducted in England by Serpell (1991) who examined the health consequences of acquiring a pet for people who had not recently owned a pet. Forty-seven people acquiring dogs, 24 acquiring cats and 26 control subjects who did not own pets were recruited to a study to investigate any changes to health status that could be ascribed to owning a pet. For this reason, all subjects acquiring pets were selected on the basis that they had not previously owned a pet for a minimum period of one year. All but three of the pet owning sample were recruited when their pets from one of two Cambridgeshire animal shelters.

Subjects were followed up from the time immediately before obtaining their pet or within two days of doing so, and at one month, six months and ten months after getting their pet. The control group were also followed up at these intervals. For the purposes of the study, in a family obtaining a pet, the person who had the greatest day-to-day involvement with the care of the pet was selected as the subject. All subjects completed questionnaires relating to demographic details at the start of the study, and physical and psychological health checklists, and a measure of recreational walking at the start of the study (baseline), and at six months and ten months later. The 30-item General Health Questionnaire (Goldberg, 1978) was administered at

baseline and at six months and ten months. The reason for omitting this at one month is unspecified.

Baseline comparisons of the three groups (cat owners, dog owners and controls) showed no significant differences in age, marital status, housing, number of minor illnesses reported or their scores on the GHQ. However, control subjects were found to be of higher socio-economic status, have less access to gardens and were likely to have fewer children.

In a within-groups analysis of changes in the course of the ten months of the study, it is reported that the control group did not exhibit significant changes in their scores on the health checklists, or the GHQ. They, did, however, report taking significantly more recreational walks, a finding which may largely be explained by the fact that much of this data were collected during the summer months. Dog owners reported significantly fewer minor physical health problems at six months and ten months (data for the psychological health checklist is not reported) and a significant decrease in scores on the GHQ at six months which was still apparent (though not significant) at ten months. Dog owners also exhibited the highest increase in recreational walking at one month, six months and ten months.

Cat owners also reported a significant reduction in minor health problems at one month, but this was not significant at later times in the study. No other changes in cat owners are apparent although the reduction in scores on the GHQ over the first six months are significant when a one tailed probability estimate was used (a different criterion than was used in the analysis of dog owners)

A between-groups comparison of subjects' health scores showed that non-owners reported significantly fewer changes at one month than did cat owning or dog owning subjects. However, no other significant differences on health scores were apparent at

other times between the groups. Subjects' scores on the GHQ also did not differ significantly between groups over time, although dog owners were found to report significantly lower scores at ten months when compared to non-owners only.

These two latest studies were to have at least as much impact as the earlier work of Friedmann, both within its own area of research and the popular press. The studies, it is widely accepted, clearly demonstrate that pet ownership can exert a positive influence on health. Yet, although they are certainly suggestive of an *association* between pet ownership and health, closer scrutiny of the studies reveals that there may not be justification that pets exert a causal influence.

In Serpell's study, although the pet owning subjects experienced significant changes in health scores, these changes were not sufficient to yield significant differences, except in the scores after one month where a between-groups analysis indicated that there was a small difference between the three groups. Scores on the GHQ declined for subjects in all groups across time, irrespective of whether they had acquired pets or not. This may have been due to seasonal factors since it was reported that the bulk of the data was collected between July and September. Although acquiring a pet appears to be associated with small improvements to health, it does not appear that this rendered them at a significant advantage over people not acquiring pets.

It is also not reported why subjects had been motivated to acquire a pet after a lapse in pet ownership for a year or more. It could be argued that people may elect to own a pet only when their family and personal circumstances are favourable to do so. Since it is known that the vast majority of subjects obtained their pets from animal shelters which check suitability of owners, their housing, lifestyle and ability to devote adequate time to a pet, it is possible that these subjects were experiencing a period of time which was comparatively stress-free, or at least were free from major stressful life events. Conversely, it is not reported why the control subjects did not own pets.

There could have been constraints such as time needed to care for an animal, hectic lifestyle, dislike of animals and so-on. Indeed it seems that such a contrast may be valid since Serpell (personal communication) has indicated that later analysis of the data controlling for occurrence of stressful life events negates many of the significant changes reported in his published work.

Despite these comments, both the Anderson and the Serpell studies are strongly suggestive that pet ownership and health may be associated. However, neither of them offer any explanation as to how the health benefits may be brought about, if indeed, the effect is causal in nature. Thus whilst clearly fuelling the by now widespread belief that pets are beneficial, they offer little in the way of pointing the direction for future research into explanatory mechanisms.

Chapter 2: Explanatory principles

2.1 Relationships between pets and their owners.

A particular body of research has focused on the nature of the relationship between pets and their owners. In part this has been influenced by the desire to find adequate explanations for the benefits to health, as reported first by Friedmann, by examining the characteristics of the person-pet relationship. Borrowing the descriptions of the human-animal relationship from earlier studies of the use of animals in therapeutic setting for people with psychological disorder, this area of research concentrated on the affectionate relationship that a person may have with their pet, the availability of the pet for interaction, the unconditional nature of the relationship, feelings of self-esteem that may emanate from such a relationship and the reductions in feelings of isolation, alienation or loneliness. Combined with studies documenting the distress experienced at the death of a pet, research into person-pet relationships took the view that these relationships could be regarded as significant relationships, characterised by positive emotion and shared activity and this could potentially hold explanations for health benefits.

A very large number of studies in this area resulted in a plethora of person-pet relationship scales for investigating the characteristics of the relationship. The vast majority centred on attempts to characterise the relationship as an 'bond' or an 'attachment' as way of assessing closeness, affectional content and mutual activity between owner and pet. The use of the terms 'bond' and 'attachment' became synonymous in the literature and were rarely afforded definition. Attachment scales tended to be constructed ad hoc and, although they contain broadly similar content areas, little or no attempt was made to standardise a scale for the use in assessing the strength or content of a person-pet relationship. However, some association with health outcomes has been reported. Ory and Goldberg (1983) reported that attachment

to pets was associated with happiness in older white American women and later studies of bereaved elderly people showed some evidence of an association between pet ownership, pet attachment and better physical or emotional status (Akiyama, Holtzman and Britz, 1986; Bolin, 1987).

Calls for a standardised instrument for measuring the type and/or content of the person-pet relationship can be traced back to 1985 (Holcomb, Williams and Richards, 1985) and the construction of the CENSHARE Pet Attachment Survey, a 29 item scale containing two subscales 'relationship maintenance' and 'intimacy'. This scale is one of the first to make a claim for a theoretical foundation based on the concept of psychological attachment, basing its concept of attachment on Ainsworth and Bell's (1974) typology of attachment of a child to a parent caregiver, although the applicability of this typology was not empirically tested. Attachment appears to have been based on desired proximity and caretaking. Results of two studies reported by Holcomb et al are mixed. Primary care givers in one study appeared to score higher on intimacy than non-primary owners but not on relationship maintenance, although dog owners did score significantly higher on relationship maintenance than cat owners. In contrast a second study showed higher scores for relationship maintenance but not for intimacy for primary owners over non-primary owners. Although work continued to achieve a more reliable scale, its aim to become a standardised scale did not materialise and researchers continued to make construct their own scales.

Poresky, Hendrix, Mosier and Samuelson (1987) attempted to redress this through the construction of the Companion Animal Bonding Scale (C.A.B.S), an eight item scale containing items on care for the pet, stroking or pet contact, play, feelings of a close relationship, travelling with a pet and allowing the pet to sleep in or near the owners' room. Claimed to be based on the psychological concept of attachment, it aimed to assess the significance of a pet in a person's life through activities and emotions believed to underlie a relationship that could be termed an attachment. The scale

appears to have good reliability, Cronbach's alpha coefficients of 0.77 and 0.82 are reported. It is also reported that the scale yields three factors, 'bonding', size of the animal as inferred by sleeping arrangements; and responsiveness of the animal. These factors are reported to account for 41%, 14% and 9% of the total variance. However, scrutiny of the principal axis factor analysis suggests that the claim for three factors may be suspect since all items, not just those that could be seen to demonstrate closeness or 'bonding', load most heavily on the first factor. It is also difficult to accept that a reliable three factor scale can be obtained through eight items. However, the scale has not been widely used, and the tendency to construct ad hoc scales persisted.

Stallones, Marx, Garrity and Johnson (1988) constructed a scale to examine attachment to pets in older adults. Six items on talking to the pet, regarding the pet as a friend, belief that the pet added to happiness, talking to people about the pet, playing with it, or believing the pet knows how the owner feels, were taken to assess the level of attachment. However, the scale produced little variance in the responses and yielded Cronbach's alpha coefficients of 0.58 or lower. The Pet Attitude Inventory (Wilson, Netting and New, 1987) although lengthier, produced a similar lack of variance in responses.

These are just a few of the many scales prevalent at the time. All aimed to achieve some measure of the characteristics and content of person-pet relationships in an attempt to tease out explanations for reported health benefits. In fact, the association between attachment, as measured by the scales, and health advantages is weak. While some studies found that the strength of a relationship with a pet did correlate with greater physical and/or psychological health (e.g. Lago, Connell & King, 1983), numerous studies did not (e.g. Powell Lawton, Moss & Moles, 1984).

Notwithstanding this, using attachment as a way of characterising person-pet relationships and as a way of explaining health benefits became widespread, even

universal, in the field of companion animal studies, and remains the dominant explanatory variable in attempts to explain reported health advantages.

2.2 Attachment as an explanation for reported health advantages.

Up to the early and mid 1980's, there had been little work to explain reported health advantages accruing to pet owners. This was recognised by both researchers in the field and its critics. Explanations that could be rooted in a theoretical framework were needed. The evidence from observations of psychiatric patients' relationships with animals (Corson et al, 1975) together with the evidence from Friedmann et al (1980) that pet owners survive coronary heart disease can be viewed as underlying the strong intuition that the explanation may well lie in the nature of the relationship between owner and pet. Attachment was seen to be a prime candidate explanation. This concept been developed in ethnological studies of the bond between offspring and parent to ensure survival and well-being, and had been extended for use in describing human relationships, primarily the relationship between a baby and its primary carer (Bowlby, 1969). Perhaps because of this connection with the animal behaviour literature, and the involvement of an unsophisticated partner (child or animal) in an asymmetrical relationship, attachment was seen as a plausible framework to apply to a relationship between human and animal.

However, the adoption of attachment has not been without its problems. Rather than embarking on empirical research to establish whether the person-pet relationship contained elements or components that strongly resembled attachment, it appears that researchers uncritically adopted this concept as a convenient way of simultaneously describing and explaining the relationship and its possible consequences for health. There is a striking absence of empirical or conceptual analysis into how or in what ways the concept is appropriate for use in person-pet relationships. Moreover, it is often unclear exactly how attachment is being used. At one level the use of the term is

consistent with the more everyday usage, broadly translatable into a close relationship characterised by fondness or affection. In one sense this is not inappropriate, but it is important to note that the common everyday usage of attachment removes the explanatory power afforded by the more narrow precise meaning of attachment as utilised in psychology and ethology.

Many researchers have used the term attachment as synonymous with a 'bond'. Again, this is not wholly inaccurate if merely using the terms in an everyday use, but it is not consistent with the use of the terms within attachment theory itself. However, there are sufficient references to attachment theory cited in studies investigating the person-pet relationship to indicate that the terms are not being used in their everyday sense, but are attempting to utilise attachment theory as an explanation. Nevertheless, the terms were not used in ways consistent with attachment theory. Clearly this detracts from the usefulness in adopting attachment theory as an explanation, and may even be damaging to the field if perceived to be used inaccurately.

2.2.1 Attachment theory and "attachment" to pets

To examine the validity of the claims that attachment may be used as a description of the person-pet relationship and/or as an explanation for health benefits accruing to pet owners, it is necessary to examine attachment theory. Only a brief summary is presented here, a more detailed account is contained in Collis & McNicholas (1998).

In psychology, the term 'attachment' has most commonly been used in a narrow technical sense to refer to the close relationship of a young child to a parent, based on feelings of 'felt security' (Bowlby, 1969) which motivates the child to maintain close proximity to the parent. It is important to note here that 'felt security' is regarded as a distinguishing feature of attachment, and refers to a sense of well-being and freedom from anxiety whilst in the company or proximity of the attachment figure. This 'felt

security' does not arise from knowledge of protection from specific threats (since a very young child is not sufficiently cognitively competent), rather it is a less specific feeling of not needing to feel anxious or vulnerable. Separation from the attachment figure provokes feelings of distress and anxiety even in the absence of any threat.

Ainsworth (1989) also sanctions a slightly broader use of the term attachment to include other relationships where there are good grounds for believing these are derived from child-parent attachments or based on the same function of felt security. Clearly, many relationships do not meet these criteria and are not attachments.

The term 'affectional bond' in attachment theory is rather broader than the term 'attachment' and refers to the attraction and affection felt by one individual for another particular individual or individuals. This can be translated into what is commonly thought of as a close relationship. The feature of felt security does not need to be present for a relationship to be characterised as a bond, and even what most people would consider as extremely close relationships would not be categorised as an attachment without this feature. For example, whilst the young child-to-parent relationship may be properly regarded as an attachment because of the role of felt security as a prime motivational force, the parent-to-young child relationship is more accurately termed a bond since it lacks the central feature of felt security (Ainsworth, 1989). In essence, the term 'bond' may be used as a superordinate category to classify all close relationships, but 'attachment' may only be properly applied to a subset of bonds which contain the element of felt security.

So far, the focus on attachment theory as has been briefly described has concentrated on its state prior to the 1990's since this was its position at the time of the construction of the majority of the Pet Attachment Scales and claims for a role of attachment in human-pet relationships.

From the late 1980's there has arisen a very large body of research examining adult attachments, especially - but not exclusively- romantic attachments (e.g. Hazan & Shaver, 1987; Sperling & Berman, 1994). Whilst adult attachment is indeed an important area for research, this area highlights the question of how far one and how flexibly one may use the concept of attachment. In a paper which inaugurated this new area of research, Hazan & Shaver (1987) made mention of the role of felt security but did not give it a prominent role in their arguments or data. In playing down the key feature of felt security in favour of an emphasis on proximity seeking and pleasure in being in the company of a particular individual, theorists render attachment almost indistinguishable from affectional bonds and this leads to a loss of the explanatory power of attachment as a particular relationship that may offer, if not physical health advantages, at least some components of psychological well-being.

This apparent move toward generalising attachment to relationships that may be more properly regarded as affectional bonds is likely to be the motivation underlying Ainsworth's restating of her understanding of attachment. In an important series of papers Ainsworth (e.g. 1989)- a major attachment theorist who worked with Bowlby for many years - gave perhaps her most explicit views of what constitutes an attachment. She suggested that a subset of adult relationships may be regarded as affectional bonds if they are based on a long enduring tie in which the partner to the relationship is important as a unique individual. Some affectional bonds may also be attachments *if* there exists the component of felt security. Where this is absent, the relationship is either an affectional bond if characterised by affection or love, or merely a bond such as exists with lesser, perhaps more replaceable, relationships such as casual friendships or working relationships. The main conceptual distinctions being made by Ainsworth are depicted in figure 2.1. The importance she places on the role of felt security has been taken up by West & Sheldon-Keller (1994) who suggest that 'a relationship becomes an attachment relationship when the primary purpose of the relationship is the provision of security' (p160).

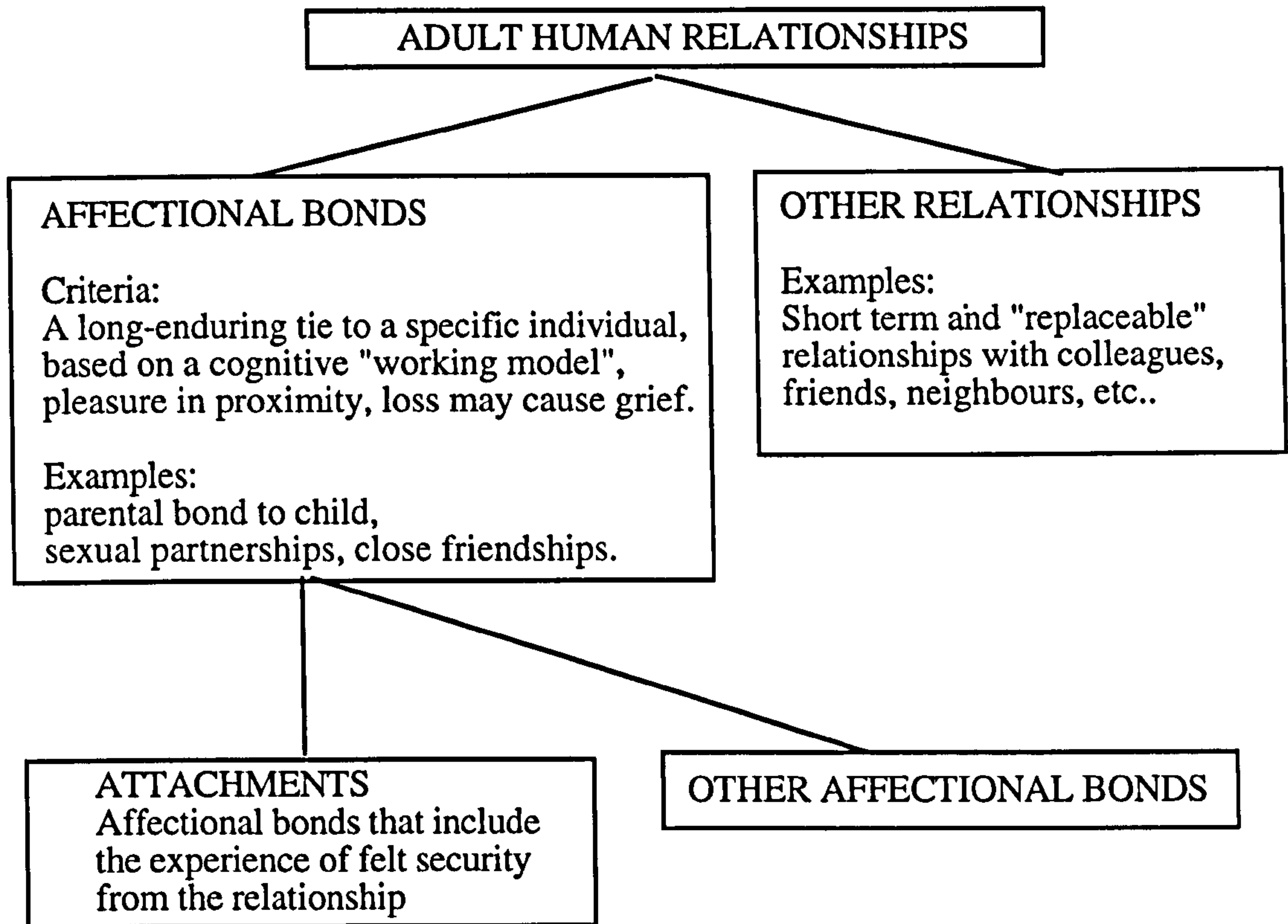


Figure 2.1: Ainsworth's typology for adult human relationships from the perspective of attachment theory.

This is not to say that relationships, especially close relationships, may not have important implications for health and well-being. It will be argued later that this may well be the case, although not through the mechanism of attachment. For the time being, it will be argued that the concept of attachment has little use as a means for explaining health advantages associated with pet ownership. Indeed, it is unlikely that the person-pet relationship is an attachment at all in the strict sense of the term.

Perhaps the most striking problem in the adoption of attachment theory is the absence of empirical research to establish similarities between human attachments and person-pet relationships. Attachment theory appears to have been merely borrowed and applied to person-pet relationships as a convenient vehicle. Examination of the

literature on human attachment theory current at the time when the concept was adopted for person-pet relationships strongly suggests that the concept was at best poorly understood by theorists in companion animal studies and, at worst, very misused. Many studies fail to define attachment whilst adopt unorthodox, even inaccurate, definitions. For example, Holcomb, Williams and Richards (1985) define attachment as being based on proximity seeking and caretaking. Poresky et al (1987) adopt proximity seeking and love. Despite references to both Bowlby and Ainsworth, the element of felt security is absent from the definitions. This is not in accord with mainstream attachment theory since without the key criterion of felt security, the relationship cannot properly be called an attachment (West & Sheldon-Keller, 1994).

Proximity seeking, the desire to maintain a relationship, or caretaking are not confined to attachment relationships. Indeed, caretaking characterises many non-attachment affectional bonds. Proximity seeking need not be for the purposes of security, since sexual relationships naturally involve proximity seeking. Nor does love or caretaking provide key elements of attachment. Love may indeed be a strong emotion within an attachment but not exclusively so. Caretaking is likely to run counter to receiving a sense of security from the person being cared for, even though the carer may indeed provide security for the other. As Ainsworth emphasised, this may include the parent-to-child relationship since in spite of being heavily imbued with both love and caretaking it does not provide the element of felt security for the parent and thus the parent could not be said to be attached to the child.

Even if the definitions of attachment had contained the necessity for felt security it is unlikely that the person-pet relationship could be seen as to fulfil the criterion.

Feeling 'comfortable' with one's pet, liking to have it nearby or even seeking it out to establish proximity is not the same as felt security. Nor is the specific deterrent role of a dog against burglary or assault the same as felt security, rather this is a cognitive appraisal of likely threat and the actions that might be taken to avoid it, much in the

same way as the fitting of a burglar alarm or the avoidance of walking alone at night. Felt security, in attachment theory, denotes a non-specific sense of well-being, perhaps only detectable when absence of the attachment figure provokes anxiety despite the absence of specific threat.

This also raises the point of who is attached to whom in the person-pet relationships. Classical attachment theory describes the attachment of the weaker partner to the stronger as means of ensuring well-being. In this respect the relationship is asymmetrical. Person-pet relationships, too, are asymmetrical but for attachment theory to apply it would mean that the owner - the more powerful, more cognitively able partner - is attached to the lesser partner, the pet. The pattern of asymmetry is reversed and researchers adopting attachment to describe person-pet relationships have not explained how they deal with this point.

The misunderstanding or misapplication of attachment theory is borne out in the nature of the numerous pet attachment scales constructed at this time. These do not appear to have been based on scales relating to attachment in humans, rather they contain items that could broadly be viewed as measuring affection, mutual activity, proximity seeking, inclusion in family activities and companionship (Holcomb, Williams & Richards 1985; Johnson, Garrity & Stallones, 1991; Poresky, Hendrix, Mosier & Samuelson, 1987; Wilson, Netting & New, 1987). There is little in these scales to tap into concepts of attachment, and discussion of their degree of similarity with attachment and with non-attachment types of relationship.

Some scales contain items on how the owner would feel if the pet died or was lost, and some studies have explicitly examined reactions to pet death. Findings which document distress at pet death are frequently accepted as strengthening the position that person-pet relationships are attachments. However, two important aspects are overlooked.

Firstly, although Bowlby's work 'Attachment and Loss' is frequently cited, it seems to be taken as implying that distress at a loss of a relationship must mean that it was an attachment. In fact, it would appear that his work is cited only because of the assumptions that person-pet relationships were attachments. No reference can be found to work investigating other losses or stressors, perhaps because this was seen as inappropriate by those researchers seeking confirmation of the relationship as an attachment. Yet loss of other relationships can also provoke distress. Ainsworth's views are that grief or sorrow at loss is characteristic of all affectional bonds, not just attachments (Ainsworth, 1989). Indeed, the measures of distress at loss, such as appetite and sleep disturbances, pre-occupation with the thoughts of the incident, lapses in concentration, crying etc. (Archer & Winchester, 1993; Rajaram, Garrity, Stallones & Marx, 1993) are typical of responses to stressful life events in general, and have been extended to non-relationship events such as involuntary unemployment (Warr, 1987) and other non-loss stressors such as examination stress (McNicholas & Collis, 1996) and occupational stress (McNicholas, Collis, Roche & Lavis, 1996).

Far from strengthening the assumption that person-pet relationships are attachments, work on pet loss merely builds on the problems introduced by adopting of attachment theory. In assuming the attachment model, it has attempted to interpret reactions to pet loss through the framework of attachment. This has led to further problems such as the adoption of the terms grief and bereavement for use in pet loss literature without empirical foundation. Pet owners certainly do experience many effects arising from the loss of a valued pet, but it has yet to be established how best to describe these reactions. To uncritically apply the term bereavement with no evidence other than the assumption that an attachment has been lost is erroneous. It leads to a belief that we know more about what is being experienced than we have evidence to support. It also leads to a curious cycle of misuse of terminology whereby the relationship is perceived to be an attachment because the reaction to loss was one of

grief and the presence of grief (via application of bereavement) denotes loss of an attachment.

A second aspect that is overlooked is that the work on pet loss largely ignores the range of effects that pet owners may feel when experiencing pet loss. As stated earlier, pet loss can provoke symptoms associated with both loss and non-loss stressors, but there is little evidence to suggest that this affects all or the majority of pet owners. The evidence of abandoned animals, pets offered for euthanasia etc. suggests that not all owners are even fond of their pets, let alone 'attached' or 'bonded' to the degree where adverse reactions would be experienced on loss. So what proportion of pet owners are likely to experience loss related reactions? And what proportion of these would be extreme? There is very little evidence that these issues have been addressed by the research and yet they are vital if one wishes to apply the term 'attachment' to person-pet relationships in general.

Even where the person-pet relationship is of a nature which produces adverse reactions on loss (such as where it may truly be regarded as an affectional bond), pet loss is rarely as disruptive physically, psychologically, socially or behaviourally as loss of a human relationship, nor are the effects as long lasting. It is probable that pet loss is more accurately described as a stressful event than a bereavement (McNicholas & Collis, 1995) or as a loss of an attachment.

In summary, it would seem that the person-pet relationship does not fit easily with psychological or ethological perspectives on attachment theory. Moreover, it is notable that attachment theory, as applied to human relationships, has not been utilised to directly explain physical health, rather it has been used in developmental psychology as being linked to adequate emotional and social development of a child. Whilst this may have some bearing on the child's subsequent ability to form the sort of close relationships which may afford health advantages, this is not a direct

assertion that attachment is itself an explanation for health benefits. Thus, the use of attachment as a description and an explanation of the person-pet relationship and reported health advantages would seem to be inappropriate and perhaps even damaging to research in the area in its misapplication of the theory.

Even if attachment, in its narrowest sense, were abandoned in favour of some other term that denoted a close relationship, could pet-person relationships explain health advantages? Perhaps not entirely. Friedmann's experiments on heart rate and blood pressure levels in the laboratory tasks used a dog not owned by the subject - relationship did not enter the equation. Serpell (1991) did not measure the relationship (or the development of a relationship) between new owner and pet. Anderson et al (1991) assigned subjects as pet owners on no further criteria than living with an animal in the same household. They did not investigate strength of relationship, activities, time spent together or any of the other items appearing in the customary pet attachment scales. Consider also the earlier work of Corson et al (1975). The psychiatric patients did not own the pet and it is also debatable whether they had been in contact with the pet for long enough to qualify the relationship as an affectional bond, yet there were reported improvements in their condition. Is the relationship with a pet the key explanation to health benefits, or could there be some other explanation? So far, there is little evidence that this has been addressed.

Also, what of the pet attachment scales themselves? They clearly measure something, if not attachment then some more general indicator of relationship qualities. Can they lead to health benefits via some explanation other than attachment? As will be argued in Section 4, the relationship with pets may well provide some answers to how pets may influence health, but not because of attachment. The focus shifts from asking 'what is the relationship?' to 'what does it do?'. This is seen as a more valuable standpoint if one wishes to investigate the relationship as a basis for provisions of

health benefits, and taps into the mainstream research into relationship provisions and social support.

2. 2 A framework for the study of pet ownership and reported health benefits.

Overall, it would seem that the field of companion animal studies needs to take stock of itself, to critically review its findings and its directions for future research. It needs to focus on providing plausible explanations and better fitting frameworks through which to guide research and interpret findings. It is probably fair to say that there *are* important findings that require explanation, but so far they have become merged and obscured by a tendency to view the area as unitary rather than potentially multidimensional with more than one explanation. Perhaps it is time to unravel findings and directions to construct a new framework.

This requires taking a detached view of research as it stands. What appears to be the fundamental findings? Can they fit together? It is useful to itemise what are considered the major findings

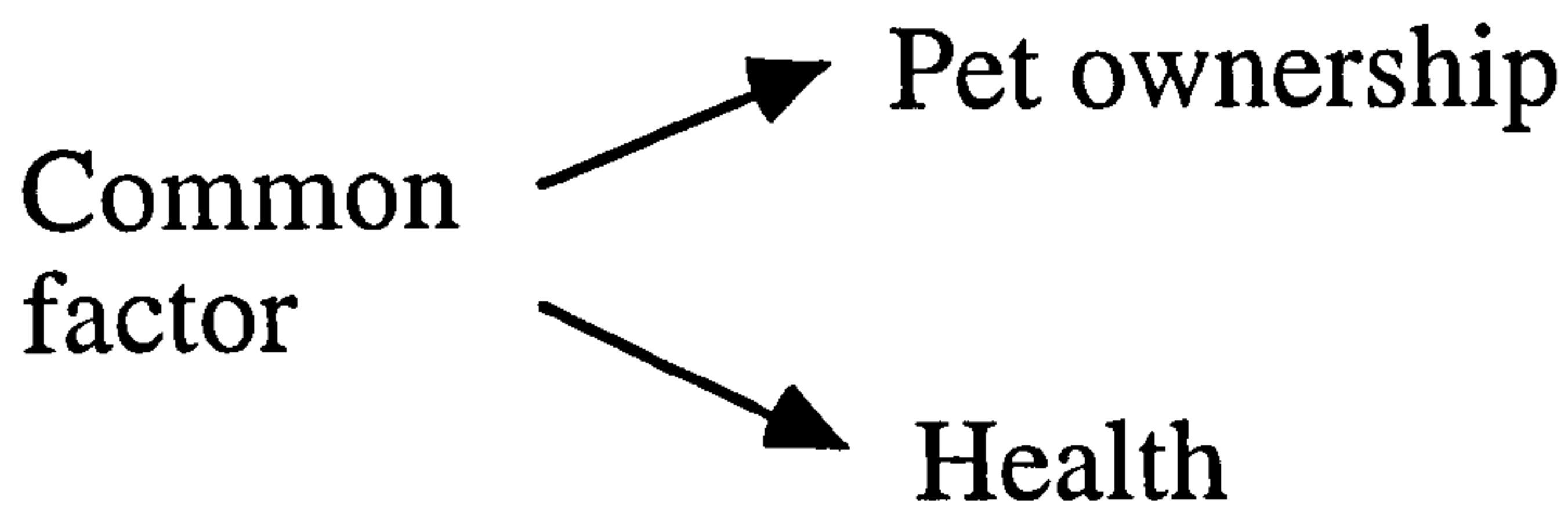
1. Pet ownership appears to be linked to health advantages (Friedman, Serpell, Anderson) although no explanation is offered.
2. Pets, or more particularly dogs, can act as social catalysts, facilitating human interactions
3. Pets appear to have an effect of lowering blood pressure and or heart rate during laboratory stress tasks.
4. Person-pet relationships appear to contain elements of affection, companionship, proximity seeking etc. For some people, there may be distress at the loss of the relationship.

Can health advantages (1) be explained by points (2), (3) and (4)? Probably not if one tries to draw them together to fit into single explanation, but separately they may point to different mechanisms which *could* influence health.

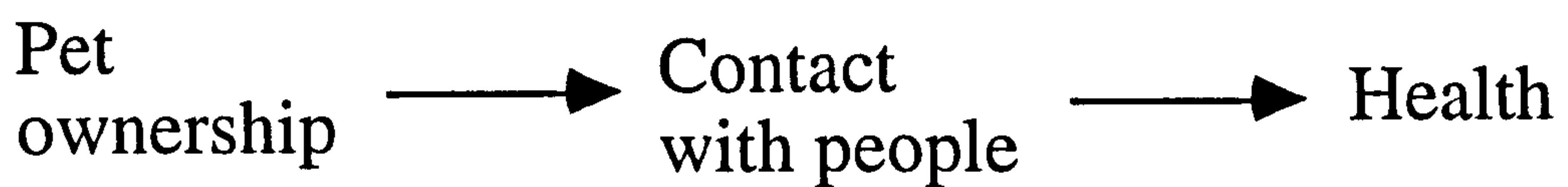
As yet there has been no theoretical framework through which to examine the reported associations between pet ownership and health. A primary objective of this thesis is to forward a useful model to aid the investigation of, firstly, what benefits may accrue to pet owners and, secondly - perhaps more importantly - the potential mechanisms that may bring such benefits about.

A tri-partite model is proposed, whereby three classes of explanatory mechanism are offered as possible ways in which an association between pet ownership and health benefits (if this association can be supported) may arise. This model is shown diagrammatically in Figure 2.2. The three classes of explanation provide structure to the empirical work presented in this thesis and will be discussed in more detail at the beginning of each section. However, it is useful here to broadly outline the theoretical underpinnings of each of the three classes of explanation.

1. Non-causal associations



2. Indirect effect of pet ownership



3. Direct causal effects of pet



Figure 2.2: Three classes of explanatory mechanism for an association between pet ownership and health benefits

2.2.1 Non-causal association

The association between pet ownership and health may be due to an intervening factor that can explain both health benefits and the propensity to own a pet.

The first class of explanation examines an area not featuring strongly in current research i.e. that the association between pet ownership and health may be non-causal

in nature. Indeed, research has been rather too ready to ascribe causality to pet ownership in explaining health benefits, ignoring the possibility that pet ownership may be merely symptomatic of either health itself or of some other factors predisposing toward health. As an analogy, a doctor finding his waiting room full of patients with bad backs after the first sunny weekend of the year is unlikely to conclude that there is a link between sunshine and bad backs. Rather he will attempt to establish what activity his patients have been engaged in to result in the symptoms they have in common - the first major tidying of the garden, perhaps. Could there be an equally obvious, or even a less obvious, explanation for health benefits accruing to pet owners? Thus, rather than pet ownership exerting a direct or even indirect influence on health, the association may be attributable to some other intervening variable or factor that influences both health advantages and the likelihood of pet ownership.

At its most basic level this class of explanation articulates an argument that an association between pet ownership and health benefits would be explainable, even expected, if only healthy or less illness-prone people elected to own pets. This is a plausible explanation since pet ownership can involve considerable investment in time and effort. People who may be experiencing poor health may be deterred from acquiring a pet, or, if already pet owners, may take the decision to dispose of their pets, leading to them being categorised in studies as non-owners.

Although current health status may influence pet ownership, other factors may also exert a powerful influence on health and, perhaps, pet ownership. Whilst it is true that some studies have attempted to distinguish between personality characteristics of pet owners and non-owners, this in itself is unlikely to yield explanations for any health benefits. It is argued that it would be more profitable to investigate factors previously shown to influence health. Two studies are presented as illustrations of investigations within this class of explanation. The first examines *Type A behaviour* as a lifestyle

widely held to predispose towards stress-related illness, in particular the increased risk for coronary heart disease. This lifestyle, characterised by time urgency, goal orientation, striving for achievement, impatience and aggression, may well predispose toward illness. It may also lessen the likelihood of pet ownership as not being compatible with such lifestyle and aspirations. Study 1 examines whether people with this form of lifestyle are under-represented amongst pet owners.

Studies 2 and 3 examine *hardiness*, a personality characteristic believed to account for some people's ability to cope with stressful events and so avoid many of the psychological and physical effects of stress that may lead to illness. Accepted to be made up of three components - commitment, control and challenge - the concept of hardiness has been explored in an attempt to explain why some people become ill and others stay well when experiencing similar circumstances. Since pet ownership involves degrees of commitment and responsibility, control and varying levels of problems that could be viewed as a challenge to coping, it is also plausible that non-hardy people could avoid pet ownership because of perceived problems that may arise. These studies look at whether hardiness is related to pet ownership in an adult sample, and, in a student sample, whether hardiness is related to better physical and psychological health, and also to wanting to own a pet in the future.

In essence, the non-causal class of explanation poses the question of people differ in ways that could be demonstrated to be both potentially health enhancing and increase the likelihood of pet ownership. As will be argued in Section 2, this may have important implications for studies such as those conducted by Serpell, Anderson & others.

2.2.2 Indirect causal association

Pets may act as social catalysts facilitating human interaction. It is this increased human contact that may lead to health enhancements.

This second class of explanation brings together two areas of research; the influence of social integration and social networks on psychological and physical health, and the role of a pet as a social catalyst in facilitating social interactions and communication with others, as demonstrated by Messent (1982) in dog walkers from a normal sample, and by Corson et al (1975) in psychiatric populations. Although neither study laid claim to health benefits arising from increased social interaction, the literature on loneliness or conversely the value of social integration, has demonstrated that these aspects can be related to physical and psychological health. In this class of explanation, the pet is regarded as significantly contributing to ways in which the pet owner can benefit from human interactions, any influence to health being primarily attributable to the human contact, either in the form of casual positive interactions or the beginnings of more permanent friendships. This would permit an explanation for health benefits arising from pet ownership that was rooted in mainstream health psychology and without directly inferring a role for factors involving any type of relationship with the pet. Indeed, it would be possible under this class of explanation for benefits to accrue even if no relationship (perhaps even a negative relationship) were formed with the pet.

Until recently, most work on pets as social catalysts concentrated on increased interactions between dog owners in areas designated as 'dog walking' places such as parks and recreation grounds. For this thesis, studies 4 and 5 were conducted to examine the robustness of the catalysis effect. Both made use of dogs trained not to initiate attention from people so as to ensure that all interactions originated from people encountered in the studies. Study 4 investigated the catalytic effect of a dog in

areas not normally regarded as dog exercising areas. Study 5 sought to examine the catalytic effect if the appearance of dog and or handler were manipulated in ways that could make them less attractive or approachable. The catalysis effect remained very strong and is believed to be a robust effect which may have implications for health benefits.

Accordingly, study 6 proceeded to investigate the social networks of a group of pet owners and non-pet owners and the health status of each group. This study (Chapter 6) investigates the number, type and characteristics of relationships in the social networks of pet owners and non-owners, whether any relationships are attributable to pet ownership, and whether this can be related to health status.

2.2.3 Direct causal association

Pets may have a direct influence on human health . There are at least two possible mechanisms. a) the person-pet relationship may contain elements that mirror supportive functions found in human relationships and which are known to enhance psychological well-being; b) pets may exert a direct physiological effect that may have health enhancing properties.

The third class of explanatory mechanism focuses on ways in which pet ownership may exert a direct influence on physical and psychological health. Two approaches are examined within this class. Firstly, a relationship-focused explanation within this class concerns itself with *functions* of the person-pet relationship which may afford health benefits. In particular, this approach centres on the possibility that social support, widely accepted to be a major influence on health and well-being in human relationships, may also be derived from person-pet relationships. Studies are presented from a number of populations including many for whom pets have been regarded as affording special benefits, e.g. children (study 7, chapter 8), young people

with autism (study 8, chapter 9), and people with physical disabilities (study 9, chapter 10). These studies are not a return to attachment theory, rather they centre on what the relationship does, in terms of positive functions, not what it is in terms of a typology of relationships.

A second approach within this class of explanation takes a non-relationship focus and examines the possibility that pets, even if not a person's own pet, may exert a direct physiological effect. Drawn from the work of Friedmann, studies 10 and 11 (chapter 11) investigated the presence of a dog in mediating responses to a laboratory stress task. The studies seek to build on the existing work in this area by examining whether any beneficial effects such as lowering of systolic blood pressure or heart rate are attributable to the dog and, if so, why. An important issue is whether any effects are explainable by other factors that may not necessarily result in the conclusion that pets contact is the most obvious or important explanation. For example, Study 10 examines whether subjects' perceive the task as less important, or the setting and experimenters as less formal or serious, if a dog was permitted in the laboratory. In addition, Study 11 sought to assess the effect of the dog in comparison with another known stress reducer, soothing music, in an attempt to redress the absence of studies that use an additional experimental condition to compare effects of dog presence relative to other stress reducers.

Although three classes of explanation are described in the tri-partite model, it is stressed that these are not to be taken as mutually exclusive. Rather they afford a framework in which to examine how best to interpret claims that pet ownership may contribute to beneficial influences on health. The model also highlights the narrowness of reliance on the person-pet attachment relationship as an explanation since it is plausible that benefits via enhanced human contacts or direct physiological effects can accrue to people with no such relationship with their pet.

SECTION 2
NON-CAUSAL EXPLANATIONS

Chapter 3: Could Type A behaviour explain the association between pet ownership and health? (study 1)

The first class of explanation - non causal - is considered important because it considers the possibility that the association between pet ownership and health advantages may not be causal in nature. In taking this view it demonstrates the willingness to explore explanations other than the direct attribution of effects to the pet. It looks at plausible factors that could explain *both* pet ownership and enhanced health.

The implications for considering possible explanations with a non-causal link between pet ownership and health are important. At a theoretical level, ascribing causal effects of pet ownership on health requires the construction of a new theoretical framework through which to interpret results and provide explanation for the association. Whilst this may indeed become necessary, it is not a step that should be taken before other kinds of explanation are explored. It is far more parsimonious to investigate possible explanations offered by current theories about factors predisposing towards health.

Pet ownership *per se* is not an obvious contributor to health. In fact, a counter argument could run to say that people would have to enjoy some degree of health to live independently, be able to invest the time and effort in keeping a pet, and have reason to believe that those circumstances would endure. In this respect pet ownership may be plausibly linked to other factors - personality or lifestyle - already widely believed to affect health outcomes. For this reason, it is argued that this class of explanation requires serious consideration before being too ready to lay claims for health promoting benefits of owning a pet.

Not only does this demonstrate good research practice (in first exploring more parsimonious explanations) but this class of explanation may qualify our understanding of who, if anyone, could be said to benefit from pet ownership, and the relative contribution of those benefits. So far, claims for health benefits from pet ownership have not adequately examined whether pet owners differ from non-owners in any ways likely to influence health outcome. If it were found that particular groups of people who had increased risks for health (maybe obese people or smokers) were also least likely to own pets, then the *general* claims of health benefits could no longer apply, since pet owners would be more likely to belong to a lower risk group. To put it another way, pet ownership may be more prevalent in populations who have a lifestyle which predisposes them to lower risk for health, and pets, even if found to exert a direct benefit, may be contributing less than current research suggests since the overall risk for health is less in pet owning groups.

Research into effects of pet ownership has rather taken on trust that pet owners do not differ significantly from non-owners. Although most studies have recognised the need to match non-owners and pet owners in terms of demographics variables such as age, sex, income levels etc., there can be inherent lifestyle differences or personality characteristics that could impact on health *and* the ability or desire to own a pet. So far these have not been addressed by research into the effects of companion animals on health, and it is probably fair to say that a large area of health psychology has been ignored by researchers in this field.

Indeed, recent research claiming direct effects of pet ownership on health or well-being could equally be explainable through non-causal mechanisms not attributable to the pet. For example, Serpell's (1991) study compared people acquiring a pet with those not acquiring a pet. No explanation is offered as to why the non-owners elected not to own pets. Hectic lifestyles, occurrence of stressful life events or pessimistic views of one's ability to cope with change or responsibility are all factors that can

contribute to health problems, or indeed, the perception of health problems, and which may also deter pet ownership. As a further example, Saloman (1996) reported that children from middle class families who owned pets were more likely to be high achievers at school, more likely to confide in their pets when troubled, and also more likely to confide in their parents or teachers, using them as a source of support, help and information. One explanation for this may be, as is claimed, that pet ownership fosters these qualities in a child. On the other hand, it is equally feasible that middle class families are more likely to encourage support seeking as a coping strategy, more likely to encourage scholastic achievement and articulation of problems or difficulties, - and more likely to provide pets in the belief that they encourage responsibility! It may not be the pet that elevates the child's abilities rather than the family ethos that surrounds both child and the provision of a pet. The outcomes of these studies, although couched as if demonstrating direct effects of pets, could equally be viewed as demonstrating that pets can be part of a lifestyle that itself fosters health and well-being, without it being necessary to invoke an explanation for pets exerting a direct influence. This approach still requires much more attention than afforded by current research, firstly to examine whether claims for health advantages are really attributable to pet ownership and, secondly, because good research needs to explore alternatives.

The empirical work presented in this section of the thesis, (chapters 3 and 4) outlines two variables, widely discussed in the literature on health psychology as having an influence on health outcomes. Each, it is argued, may also influence the propensity to own a pet.

3.1. Type A Behaviour

The Type A construct was first proposed by Friedman & Rosenman (1974) to describe behaviours of persons they identified as over-represented in their cardiology practice. These patients, it was noted, displayed behaviour characterised by a high

sense of competition, a desire for recognition and achievement, a sense of urgency and impatience together with a tendency toward hostility and aggression.

Since the identification of Type A behaviour, numerous studies have been conducted in an attempt to validate it as a construct and examine its predictive validity as a coronary risk factor. To date the evidence is somewhat unclear whether Type A behaviour as a whole truly predicts elevated risks for coronary heart disease or whether it may have wider implications for risk of various illnesses, especially stress related illness (Rime, Ucros, Bestgen, & Jeanjean, 1989). However, a recent Finnish study found that people with high scores on a Type A scale reported severe angina pectoris symptoms more frequently than people with low scores on the Type A scale, with high scoring male subjects also reporting more severe chest pain indicative of possible myocardial infarction (Järvikoski & Härkäpää, 1987).

For the purposes of this study we were less concerned with the validity of its predictive power for coronary heart disease *per se* than the identification of behaviour patterns which may influence both motivation to own a pet and predisposition toward a range of stress-related illnesses. A measure of Type A behaviour/personality was believed to fulfil these criteria. We selected the scale devised by Järvikoski & Härkäpää (1987) for use in this study.

Our motivation behind selecting Type A behaviour as a possible non-causal factor to link pet ownership and health is this: Type A personalities have been found to exhibit particular behaviours and attitudes that are believed to elevate their risks for stress-related illness, including coronary heart disease. These same behaviours and attitudes, such as their busy, hectic lifestyles, together with a tendency toward impatience or intolerance, and goal oriented ambition may also make them less likely to own pets. We consider it important that studies should investigate whether high risk populations are under-represented amongst pet owners. Since it is plausible that Type A personalities may not find pet ownership compatible with their hard-driving,

ambitious and materialist lifestyles, we would expect that people who score highly on a Type A personality questionnaire to be under-represented as pet owners.

3.2 Method

The sample comprised 541 employees of a City Council in the English Midlands who responded to a Healthy Living Survey arranged by the Council for its employees.

While encouraged by the Council, participation in the survey was voluntary, and returns were anonymous. There were 237 males and 301 females in the sample (three respondents did not indicate their sex). The age of the subjects ranged from seventeen years to sixty-five, distributed as follows: 44(8%) 17-25 years; 118 (22%) 26-35 years; 191 (35%) 36-45 years; 135 (25%) 46-55 years; 52 (10%) 56-65 years. One subject did not indicate her age. A broad range of occupational grades and types was represented.

The Healthy Living Survey was a questionnaire designed specifically for this study to complement an existing Healthy Lifestyle Campaign currently operated by the City Council for its employees. It comprised a series of questions on demographic variables (age, employment grade or post, marital status, children), health (major illness in the last two years), self perceived current health (poor, a few problems, fair, good, excellent), self perceived physical fitness (poor, fair, good, excellent) and lifestyle choices (smoking, alcohol consumption, membership of clubs and societies). Questions about pet ownership were included among the other questions on demographic details. Respondents were asked to indicate the number of pets in their household under the headings cats, dogs, birds, fish others, or to tick a box marked none. Respondents with one or more pets in their household were also asked if they considered any of the pets as particularly belonging to them. Our aim for the inclusion of this question was to identify if people scoring highly on the Type A scale were pet owners through their own choice, or merely by virtue of sharing a household with a pet belonging to another family member. Finally, the survey included the fifteen item Type A personality scale described by Järvikoski & Härkäpää (1987) which has been

shown to have reasonable internal consistency and good predictive validity. Our decision to use this scale was based on its recent use on a large sample of 3221 state employees in Finland. Since we understand that the scale was administered in its English form in this study, it was not piloted further for our sample and only a few very minor changes in wording were made to make it more acceptable to our British sample.

3.3 Results

In this study, and in all other studies reported in this thesis, all statistical tests and their associated probabilities are 'two-tailed'

Like Järvikoski & Härkäpää (1987) we found that one item in their Type A scale (their question 1) correlated very weakly with the sum of the other items, and we followed their recommendation that this item be dropped. With the remaining 14 items, the scale was found to have reasonably satisfactory internal consistency; Cronbach's alpha reliability coefficient = 0.654 which compares well with the 0.69 reported by Järvikoski & Härkäpää. Although this is not as high as could be desirable, it is comparable with the widely used Framingham Scale (Haynes, Feinleib & Levine 1978). Each subject's Overall Type A Score represents an average over 14 items, each on a five point scale 1 to 5. For the 529 of the 541 subjects who gave complete data on the Type A scale, the mean score was 3.208, standard deviation 0.497, median 3.214, and range 1.714 to 4.786.

Since animals from a wide range of species are kept as pets, and these are likely to vary in their role for their owners, our first comparison is between the following three groups: (i) subjects whose household included one or more cats and/or dogs (as prototypical pet species), with or without other species; (ii) subjects who had pet of other species but not cats or dog; (iii) subjects who had no pets of any species. Of the 541 subjects, 236 (43%) reported having no pets at all, 214 (40%) reported having a cat and/or a dog with or without other species, and 91 (17%) reported having other species but not a cat or dog. The other species included fish, lizards, birds, guinea

pigs, hamsters, gerbils, chipmunks, chinchillas, foxes, geese, goats, tortoises, stick insects, rats and mice.

The two sexes were more or less equally represented among these three pet ownership groups ($\chi^2(2)=4.164$, $p=0.125$), with just a slight tendency for a higher proportion of males to be non-owners. There was significant variation in the pet ownership groups among the five age groups ($\chi^2(8)=18.675$, $p=0.017$), with respondents aged 56-65 years having a higher than average incidence of non-owners, (62%) and a lower than average incidence of cat/dog owners (23%).

A three-way analysis of variance on the Overall Type A Scores comparing the three groups, with age and sex as background factors, showed a significant main effect of pet ownership group ($F(2,496)=5.356$, $p=0.005$). The mean Type A scores were 3.224 for the cat/dog owners ($N=206$), 3.288 for the owners of other species ($N=88$), and 3.067 for the non-owners ($N=232$). Pairwise comparisons using Tukey's HSD method showed both that the cat/dog owners differed from the non-owners ($p=0.023$), and that the owners of other species also differed from non-owners ($p=0.020$). These findings are illustrated in Figure 3.1. The main effect of age was marginally significant ($F(4,496)=2.366$; $p=0.052$), an effect that was almost entirely due to a quadratic trend ($F(1,496)=7.248$; $p=0.007$). Mean Overall Type A scores rose from 3.164 in the 17-25 year olds, peaking at 3.282 in both the 26-35 and 36-45 groups, and dropping to 2.997 in the 56-65 year olds. No other main effects or interactions were statistically significant at $p<0.05$.

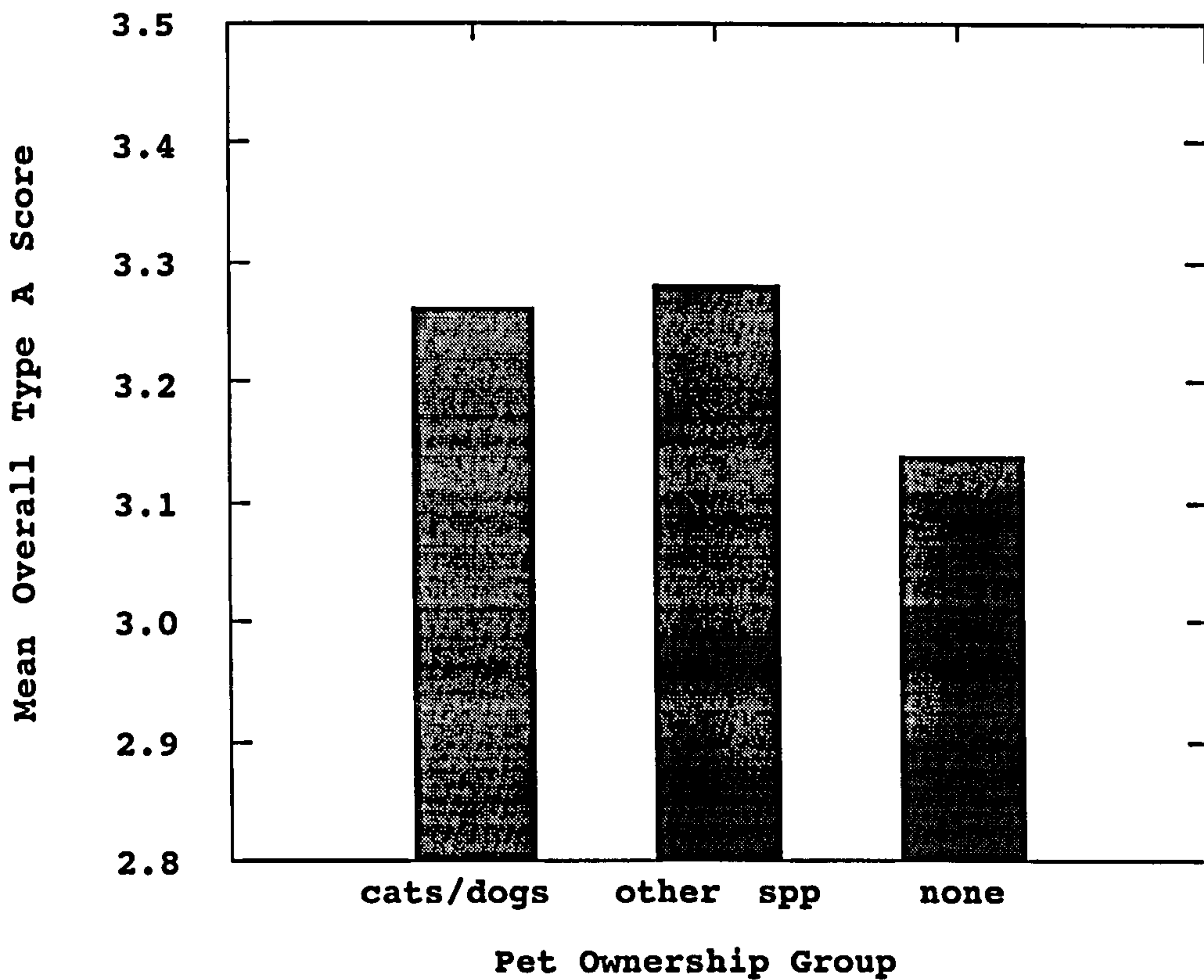


Figure 3.1: Mean Overall Type A Score by pet ownership group

These results show quite emphatically that one could not reasonably account for the reported health advantages among pet owners in terms of Type A personalities being under-represented among pet owners since the differences, though small, are statistically significant in a direction opposite to that predicted by the hypothesis.

Although cats and dogs are both prototypical pet species, they are very different in character and in relation to their owners. We therefore divided the cat/dog owners (pet owning group (i) as above) into three subgroups: (a) subjects who owned dogs but not cats (N=90); (b) subjects who owned cats but not dogs (N=85); and (c) subjects who owned both dogs and cats (N=32). In all three subgroups, some subjects owned other species too. A one-factor analysis of variance comparing the three subgroups showed no evidence of differences among their Overall Type A Scores ($F(2,204)=1.383$; $p>0.25$; means 3.202, 3.321, 3.257 respectively). The smaller number of cases in these subgroups means that this is a less powerful analysis than the previous analysis of variance, but the tiny differences between the means confirm the absence of

important differences. A full three-factor group x age x sex analysis could not be done because of the presence of empty cells, but we were able to perform an analysis which showed that a subgroup effect was not simply suppressed by main effects of age or sex.

In surveys of pet ownership, respondents are very likely to indicate that they are a pet owner on the basis that there is an animal in their household. However, the direct effects model would imply that health advantages are most likely to accrue if the pet actually belongs, in some sense, to the respondent rather than to one or more other persons in the household. Similarly, we anticipated that Type A personality would be more likely to be under-represented among those subjects who reported that a pet was especially regarded as their own pet. Therefore, for pet-owning subjects in groups (i) and (ii) (cat/dog owners and other species owners) we compared Overall Type A Scores between subjects who answered positively when asked to identify if one or more pets was specifically "yours" with those who answer negatively to this question. A three-factor analysis of variance (yours/not yours x age x sex) showed no significant main effects or interactions.

Returning to our main finding, that Overall Type A Scores are higher among pet owners than among non-owners, it is possible that this does not apply to the full range of Type A characteristics. For example, we had expected that the very aggressively competitive aspects of the Type A personality would not fit well with a pet-owning lifestyle, but we could see that the component of the Type A concept which emphasises a busy and energetic lifestyle, and the desire to always have something to do, would fit quite well with pet ownership. Moreover, Järvikoski & Härkäpää (1987) also reported that their scale showed evidence of comprising more than one dimension. We therefore carried out a multivariate analysis of the questionnaire data, simultaneously comparing the fourteen individual items of the questionnaire across the groups, in order to explore the dimensionality of the differences that we had observed in the univariate analysis on the Overall Type A Scores.

A three way Multivariate Analysis of Variance (pet ownership group x age x sex) was conducted with the fourteen items in the Type A questionnaire as dependent variables. The results are complex, with a number of significant main effects and interactions. Here we focus on the main effect reflecting differences among the three pet ownership groups so as to better understand the nature of the differences in Overall Type A Scores. The multivariate main effect of group was significant (Wilks' Lambda = 0.894; $F(28, 966) = 1.988$; $p = 0.002$), we therefore explored the dimensionality of this effect (Chatfield & Collins, 1980). Tests on the residual roots showed that the solution was essentially unidimensional. The loadings (correlations) of each item on the canonical variable representing this dimension are presented in table 3.1.

As can be seen from table 3.1, the items with the highest loadings are those which reflect a preference for being busy (with the exception of the item on being easily irritated). In contrast the items with low loadings, indicating that they do not contribute to the dimension differentiating the pet ownership groups, include items on competitiveness, ambition and possibly hostility (interrupting others' speech). Thus, we are reluctant to interpret our data as showing that the competitive and ambitious characteristics of classic Type A people are over-represented in our sample of pet owners, and our conclusion remains secure that the Type A personalities are not under-represented among pet owners. This particular trait does not provide the basis for a non-causal explanation for the association between pet ownership and advantages for health.

Item	Role in scale. Type A people tend to:	Loading	Interpretation of results. Pet owners more likely to:
I often do many things at once.	agree	0.608	agree
I get impatient when I have to wait or queue.	agree	0.450	agree
I am not easily irritated.	disagree	0.397	disagree
I am very seldom in a hurry.	disagree	0.387	disagree
I generally walk fast even if I am not in a hurry.	agree	0.380	agree
I always try to be energetic and efficient.	agree	0.372	agree
I often interrupt others when they are talking or finish their sentences for them.	agree	0.255	-
I am ambitious and always strive for new goals and better results.	agree	0.176	-
I enjoy life most when I have lots of work to do.	agree	-0.146	-
I do not like competing or setting difficult goals.	disagree	0.143	-
I do not usually compare my achievements with others.	disagree	0.126	-
I relax fully during my leisure time; work problems do not even cross my mind.	disagree	-0.097	-
I am always calm and easy going.	disagree	0.091	-
I usually eat faster than other people.	agree	0.020	-

Table 3.1: Items in the Type A scale, and their loadings on the dimension underlying differences among the pet ownership groups.

In addition to subjects' Type A scores, we also examined a number of other variables that could affect health outcomes. These were tobacco and alcohol consumption, which are known to adversely affect health, and membership of clubs and societies

which could have beneficial effects through enhanced social networks, as in the indirect causal explanation outlined in the introduction. Ratings of self-perceived health and level of fitness were also analysed.

We found no significant associations between any of these variables and pet ownership, with the exception of smoking behaviour. A question asking subjects whether or not they smoked did not differentiate pet owners from non-owners, but the number of cigarettes smoked per day was significantly greater among cat/dog owners than non-owners (Tukey's HSD, $p=0.026$).

Our survey also asked with whom the respondent shared his/her household. For analysis we divided respondents into those who lived alone ($N=59$); those whose households included one or more younger children, and possibly adults too ($N=217$); and those who lived with other adults such as older children or a spouse/partner, but no young children ($N=235$). Thirty respondents did not supply answers to this section. This classification was then compared across the three pet owning groups.

Pet ownership and type of pet owned was strongly associated with who, if anyone, comprised the respondents' family household ($\chi^2(4)=34.152$, $p<0.0005$). Respondents who had young children in their family were more likely to own pets of species other than cats or dogs (26.27%) than respondents who lived with older children or just their partner (12.77%). Cat and dog ownership was similar for this group (40.55%) and for respondents with older children or who lived with only their partner (42.98%). Respondents who lived alone were more likely not to own pets of any type (67.8%).

3.4 Discussion

The results of our study do not support the hypothesis that the presence of Type A behaviour is associated with lower propensity to own a pet. Indeed, pet ownership was associated with higher Type A scores. Clearly, pet ownership is not under-represented among Type A people. However, it should be emphasised that pet ownership is most associated with high scores on those items of the Type A scale that

focus on a desire for activity and energy. This is perhaps not surprising since owning a pet requires attention to its care, exercise and well-being. Pet owners did not score more highly than non-owners on items relating to ambition, competitiveness, comparison of achievements with others, impatience with others, or inability to relax. This should not be interpreted as indicating that pet owners are less likely to exhibit these behaviours, merely that they display no difference on these items than non-owners. Thus we conclude that the origin of the higher Type A scores displayed by pet owners is primarily due to their propensity for activity and keeping busy.

This raises an interesting question, which unfortunately cannot be addressed by this study, of whether there is a difference between high Type A scores that are primarily derived from scores on some items and high scores derived from other items. The study by Järvikoski & Härkäpää (1987) identified four factors in the 14 item scale. They labelled these as impatience, irritability and speed (Factor 1); efficiency and activeness (Factor 2); competitiveness and aspiration (Factor 3); and tenseness and inability to relax (Factor 4). The study found that subjects who experienced symptoms of severe angina pectoris had significantly higher overall Type A scores when compared to symptom-free subjects, and also significantly higher scores on items loading on the factors of impatience and tenseness. The same distinction was also found for subjects who experienced severe attacks of chest pain. We were unable to replicate the factors identified by Järvikoski & Härkäpää, which precluded any investigation into these dimensions.

It has been questioned whether it is not so much the overall behaviour pattern but the presence of accompanying negative emotions that poses risk to health. Brown (1986) points out that non-Type A persons may be as ambitious and have as much desire to achieve as Type A persons, but these desires serve to give them confidence and esteem rather than to produce negative emotions such as goading or irritation.

Similarly, Matthews (1987) reports in her meta-analysis that hostility and anxiety are significantly associated between Type A behaviour and coronary heart disease.

The suggestion that the presence of negative emotions may be linked to adverse health outcomes can help identify other variables that could mediate a non-causal explanation for the association between pet ownership and health. Health psychology has long recognised the value of *dispositional optimism* (Scheier & Carver, 1987) and *hardiness* (Kobasa, 1979) as factors that influence positive health outcomes. As with our hypothesis that Type A persons may be under-represented amongst pet owners, it is also plausible that people who are habitually pessimistic in their outlook may not desire to own pets. For example, focusing on the cost, responsibility and potential problems that a pet might bring may discourage these people from acquiring pets. Similarly, people who are 'non-hardy' in that they lack commitment, dislike challenge or lack belief in their ability to control events, may also choose not to own pets. Since both of these factors are known to have positive effects on health outcome, and could plausibly be related to propensity to own a pet, we recommend that these, and similar potential covariates of pet ownership, be investigated.

Chapter 4: Hardiness as a factor influencing pet ownership and health

This chapter examines *hardiness*, a personality attribute extensively researched and widely believed to have some influence on health outcomes. Hardiness, also known as dispositional optimism, was originally proposed by Kobasa (1979), as a variable which might explain why, in the face of stress or adversity, some people became ill whilst others stayed well. Kobasa hypothesised that hardiness, as a personality attribute, could play a part in determining the perception of stressful events and/or the resilience to them, thereby modifying the potentially damaging effects to health. Here we consider whether hardiness as a personality characteristic might also predispose towards the decision to own a pet and whether hardiness could be a factor underlying a non-causal association between pet ownership and health advantages.

4.1 Hardiness

Hardiness was proposed by Kobasa (1979) as an intrapersonal coping resource that can moderate the impact of stress on health. Whilst stress is generally agreed to have the potential to adversely influence physical and psychological health, it is also accepted that an individual's perceptions of stress, and ways of coping with stress, may themselves be influenced by personality characteristics.

Three components of the 'hardy personality' are described (Kobasa, 1982) (1) *control* - a person's belief that he/she can influence events in their lives; (2) *commitment* - a person's sense of purpose and involvement in events, activities and others in their life; and (3) *challenge* - the expectation that change, rather than stability, is normal and can offer new opportunities rather than pose a threat. In essence, these three components can be seen as parts of a prevailing life philosophy, or positive outlook, that may serve as a buffer against perceptions and/or experiences of stress.

A retrospective study by Rhodewalt & Zone (1989) looked at female students of a small arts college. Subjects were asked to identify sources of stress they had encountered over the previous 12 months; how much readjustment was needed to cope with the stressors; and whether the stressful event was desirable or not. (Stressful events can be desirable e.g. winning the lottery or getting promotion at work, but they can exert stress through the demands for change and adjustment). Rhodewalt & Zone found that hardiness buffered depression and self-reported illness. Also, it was found that although there was no significant difference between hardy and non-hardy women in the number and type of stressors they reported, the non-hardy subjects reported more events as undesirable. Figure 4.1 illustrates the findings of Rhodewalt and Zone's study.

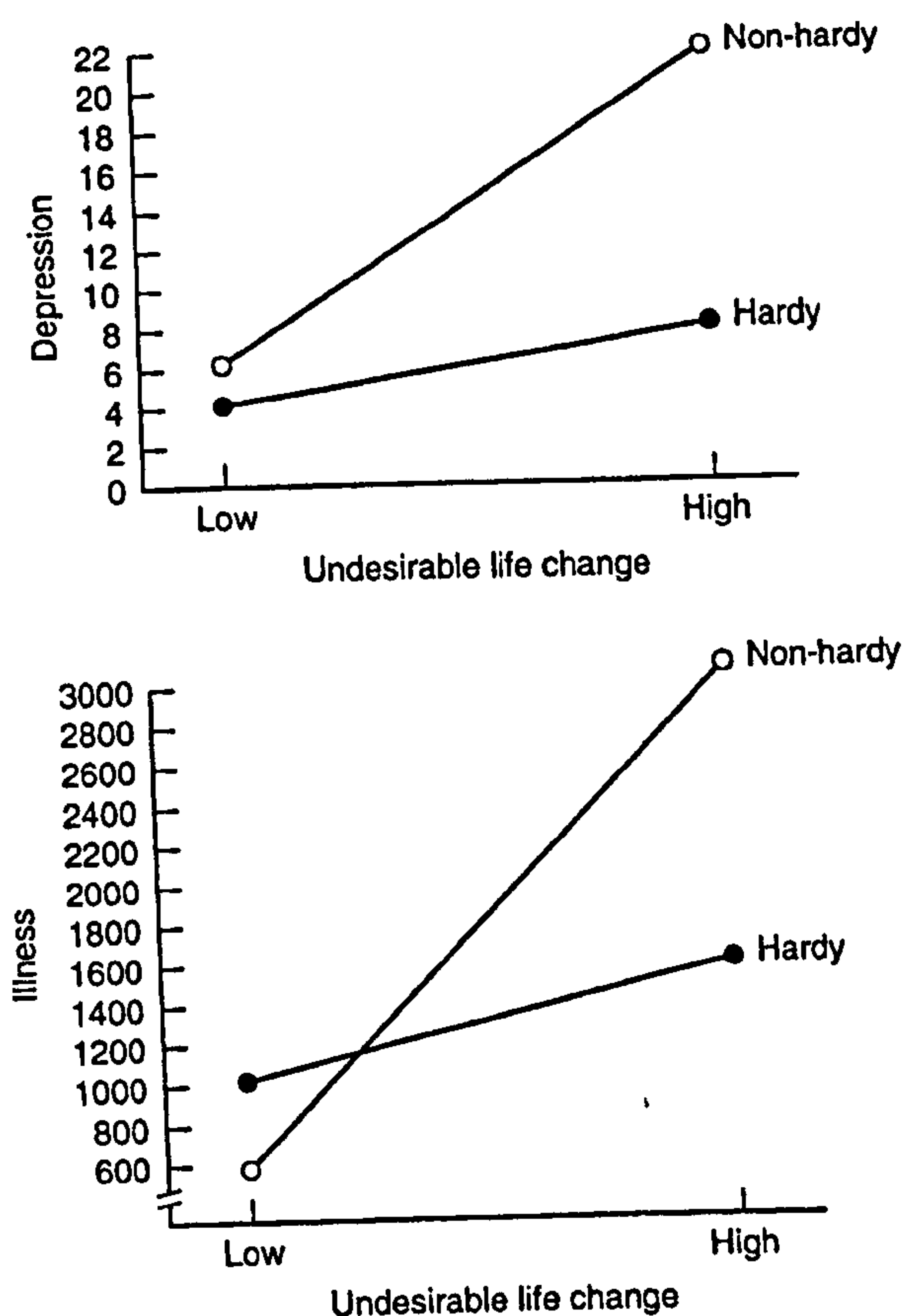


Figure 4.1: Predicted values of depression and illness for the interaction of hardiness with undesirable life change (from Rhodewalt & Zone, 1989).

4.1.1 How does hardiness moderate stress?

According to models of social psychological stress and coping, an event is perceived as stressful if it is believed to offer threat and it exceeds or threatens to exceed the resources a person has for coping with it (Folkman & Lazarus 1984). Psychological stress activates sympathetic and neuroendocrine systems resulting in increased physiological arousal. If these periods of arousal are frequent and/or prolonged illness may result through excessive strain on bodily systems (Krantz & Manuck, 1984; Menkes, 1989) or impairment of immune functioning (Jemmott & Locke, 1984; O'Leary, 1990). Weibe & Williams (1992) summarise the points at which hardiness may buffer the effects of stress (Figure 4.2). Hardiness is seen to firstly reduce the likelihood that some events will be appraised as stressful, thereby reducing their potential to induce pathophysiological arousal (Kobasa, Maddi, Pucetti & Zola, 1985).

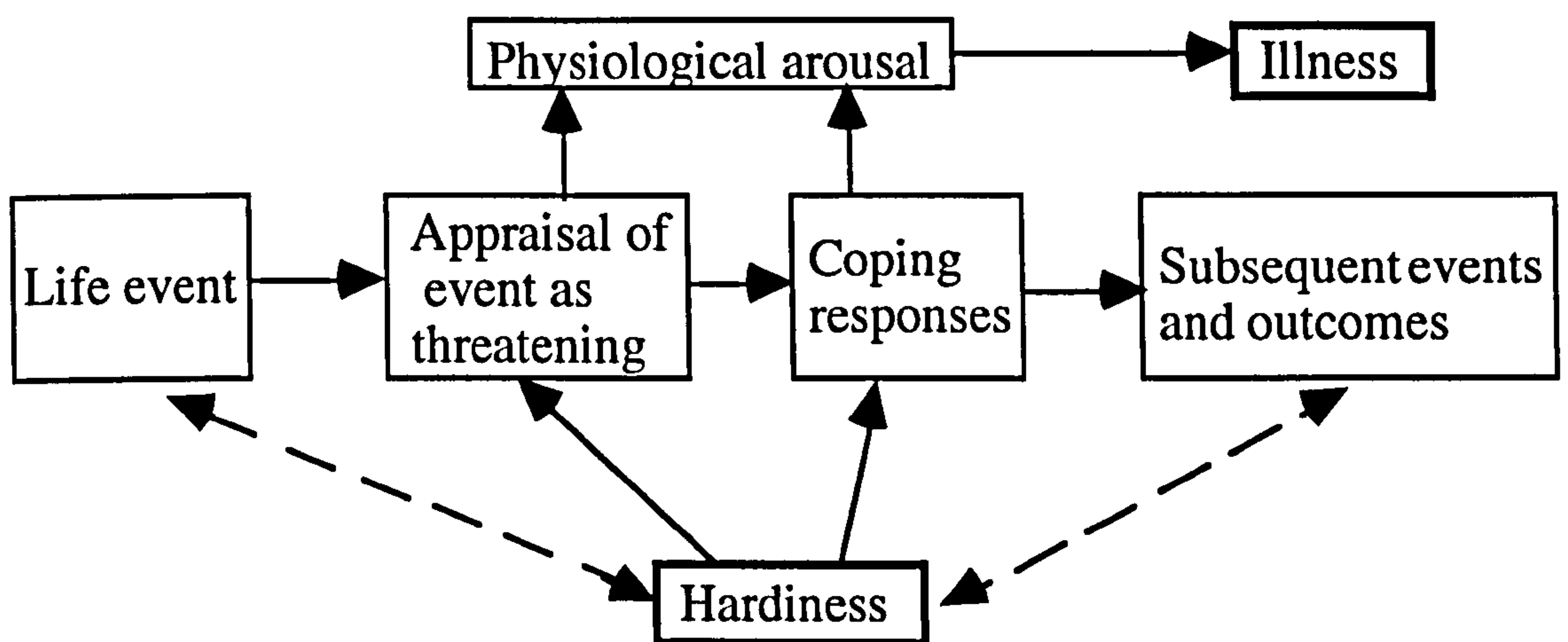


Figure 4.2: Conceptual model of the relationships between hardiness, stress and health (from Weibe & Williams, 1992).

Hardiness may also influence the methods of coping employed in response to a stressful event. High-hardy individuals are believed to utilise cognitive or behavioural

strategies which result in altering the appraisal or nature of the stressor so as it becomes more positive - a process known as 'transformational coping'. In contrast, low-hardy people are hypothesised to engage in less adaptive coping strategies such as avoidance or denial (Gentry & Kobasa, 1984; Maddi & Kobasa, 1981). However, Wiebe & Williams also point out that it has yet to be established the extent to which hardiness itself may influence or be influenced by life events and by events and/or outcomes subsequent to previous stressors.

Research into hardiness has received considerable attention in health psychology, not least because it reflects a growing awareness of a need to generate explanations for resistance to stress or adversity, as well as vulnerability. A large number of studies have been conducted in the last fifteen years which attest to the ability of hardiness to moderate the physical and psychological symptoms of stress. In a comprehensive review of hardiness research Wiebe and Williams (1992) cite fourteen studies in which high-hardy individuals report lower levels of both concurrent and subsequent physical symptoms than do low-hardy people. Evidence suggests that high-hardy individuals employ a cognitive style which permits more positive perceptions of problems, and more positive appraisal of their own abilities to address those problems, than do low-hardy individuals. In addition, low-hardy people are more likely to deny problems or to engage in distraction or comfort behaviours that may be detrimental to health, such as drinking or smoking. There is also some evidence of a relationship between hardiness and health behaviours with high-hardy individuals being more likely to display better health practices such as taking more exercise, smoking less, seeking earlier medical help for health problems and greater compliance with medical advice (Wiebe & McCallum, 1986; Pollock, Christian, & Sands, 1990).

Studies investigating the relationship between hardiness and physiological arousal to stressors are rather less numerous. However, Contrada (1989) found that high-hardy

males demonstrated smaller diastolic blood pressure responses to a laboratory stress task (mirror tracing) than did low-hardy males. High hardy individuals also reported less anger in response to the task although this was not correlated with diastolic blood pressure responsivity. Wiebe (1991), in a related experiment, reported that whilst high-hardy individuals of both sexes appraised a laboratory stressor as less threatening or disturbing, this interacted with gender to influence heart rate. High-hardy men perceived the stressor as more controllable and responded to the stressor with smaller increases in heart rate than low-hardy men. Hardiness did not influence these variables in women.

However, a later study by the same author (Wiebe, Sandford, Reese & Walker, 1992) which utilised both a goal-oriented stressor (mental arithmetic) and a social stressor (describing oneself on tape as if placing an invitation to arrange a date with the opposite sex) found that hardiness influenced responsivity for both sexes. High hardy subjects responded to both tasks with smaller increases in heart rate than did low-hardy individuals, although this was especially so in the second, social task. Wiebe suggests that mental arithmetic tasks are perhaps more male oriented and that such studies need to employ tasks that are of equal stress for both sexes.

It has also been suggested that high-hardy and low-hardy individuals may differ in their detection, evaluation or reporting of health symptoms or physiological fluctuations. Van Treuren & Hull (1987) found that self-reported arousal and physiological indices of arousal (e.g. skin conductance, systolic blood pressure, and diastolic blood pressure) were positively correlated in low-hardy subjects but not in high-hardy subjects. These findings have sparked interpretations that low hardiness may be related to neuroticism whereby individuals are internally-focused and more somatically focused. An alternative explanation offered by Van Treuren & Hull is that high hardy people may deny such symptoms since they are inconsistent with their self-perceptions as healthy, active individuals.

Although there is considerable support for the concept of hardiness as a moderator of stress and a predictor for lower levels of physical and psychological responses, research into hardiness is not without its difficulties. The original three components of hardiness - control, commitment and challenge - have only inconsistently been found to be distinct dimensions, and there is a growing trend to regard hardiness as unidimensional. This has led to revisions of many scales previously used and the construction of many ad-hoc scales, obscuring some of the comparability of studies. Wiebe and Williams (1992) caution against the use of scales not sufficiently validated and call for the use of existing well-used scales in order to advance research. They also advocate the need for clearer explanations for the mechanisms underlying hardiness as a moderator of stress responsivity.

In spite of these difficulties, there remains sound evidence to support the concept of the hardy individual as being in some way less vulnerable to the physical and psychological effects of stress through the employment of more positive perceptions of situations, their own ability to cope and their selection of coping styles.

The question arises of whether hardiness as a personality characteristic which can affect health outcomes can also influence pet ownership as a chosen lifestyle option. Are hardy people more likely to be pet owners than non-hardy people? This may be plausible. Pet ownership requires the belief that one can provide the commitment to its care and its needs; that it will provide a welcome addition to one's lifestyle rather than a burden to time or resources, and that one can successfully manage to incorporate a pet into the household without undue troubles. Taking the concept of hardiness, a positive cognitive and behavioural style of coping with a pet, added to the belief that owning a pet results in net gains in spite of some added problems the pet may bring, may mean that people displaying higher levels of hardiness may be more disposed toward pet ownership. In contrast, it could be hypothesised that low-

hardy people may be more prone to viewing the negative side of pet ownership as involving costs and responsibilities that they are reluctant to adopt. If this hypothesis were to be supported, it would provide evidence for a non-causal association between pet ownership and health benefits since hardiness itself, rather than pet ownership, is the variable associated with health, pet ownership being a facet of the hardy person's lifestyle.

There were two studies on hardiness. The first examined whether a sample of adult subjects who owned pets had higher levels of hardiness as measured by a hardiness scale than did non-owners. In accordance with Wiebe and Williams' recommendations, a well-used and well-validated scale was used for this study, being the 30-item Dispositional Resilience Scale (DRS-30 as devised by Bartone, Ursano, Wright & Ingraham, 1989). Since this study could only demonstrate a possible association between hardiness scores and pet ownership, with no indication of direction of effect, a second study examined a young student population who, whilst at university, were not current pet owners but who were asked if pet ownership figured amongst their chosen future lifestyle options. The aim here was to examine whether individuals exhibiting hardiness as a personality characteristic are more likely to initiate a desire to become pet owners.

4.2. Hardiness and pet ownership (study 2)

4.2.1 Method

A sample of 181 adult non-student subjects were recruited from community centres offering vocational/recreational courses in the daytime and evening sessions. A modified version of the Healthy Living Survey employed in Study 1 was administered with the Dispositional Resilience Scale (DRS-30, Bartone, Ursano, Wright & Ingraham, 1989) to assess hardiness. Both were self-report questionnaires distributed during coffee breaks or at the end of sessions. Modifications to the

Healthy Living Survey comprised additional questions to examine sleep patterns "at times when there are no pressures or something worrying you", and a section in which subjects were asked to indicate the relative importance in their lives of a number of life choices such as marriage, family, job, travel, social activities, friendships, hobbies and pet ownership.

The purpose of the section investigating the importance of the various life choices or priorities was to examine firstly whether these differed between pet owners and non-owners, and between high hardy subjects and low hardy subjects. Secondly, it would enable investigation of whether the rating of the importance pet ownership could be distinguished from ratings for other life choices. Other choices/priorities included home ownership, one's family, hobbies and recreational pursuits.

Subjects were aged between 17 and 45 and engaged in a variety of employments, including lecturers, nurses, firemen, clerical staff, managers, factory workers, mature students and sales staff. Subject ages were categorised as 17-25 years, 26-35 years and 36-45 years. These comprised 31%, 43% and 26% of the sample respectively. A total of 73 subjects were male (40%) whilst 108 were female (60%).

Seventy five subjects (41%) owned no pets of any kind, whilst 89 subjects (49%) owned cats and/or dogs with or without other species of pets, and 17 subjects (9%) owned only pets other than cats and/or dogs. These pets included mice, rabbits, guinea pigs, horses, hamsters, gerbils, rats, tortoises and a llama.

Treatment of results

Scores from each of the three subscales of the hardiness scale - commitment, challenge and control - were calculated to give a total hardiness score. The vast majority of subjects had completed all questions on the hardiness scale. For subjects with missing data for between only one and three questions an average for each sub

scale was calculated based on the scores from questions they had answered.

Cronbach's alpha coefficients calculated separately for the three subscales were relatively low (commitment = 0.62; control = 0.34; challenge = 0.44) but when combined achieved a more satisfactory reliability of 0.68. For this reason, analyses were conducted using the total hardiness scores rather than the subscale scores. The median of the hardiness scores (55) was then used to assign subjects to a hardiness level, high hardy subjects being those achieving scores above 55.

As in the Type A study, three principle categories of pet ownership were used:

owners of no pets at all, owners of pets other than cats or dogs, or owners of dogs and/or cats. For some analyses, such as those relating to exercise taken by subjects, differences between dog owners and cat owners were also examined. Similarly, in some analyses a distinction was made amongst pet owners for whom the pet was considered their own, personal pet, as opposed to pet owners for whom a pet was reported to be a shared or family pet.

4.2.2 Results

Association between current pet ownership and hardiness scores.

A three-way Analysis of Variance on the total hardiness scores for each subject with sex, age and pet ownership category (no pet, dog/cat and other pet only) as factors showed a no significant main effects or interactions. A similar analysis was carried out on just on those subjects who owned dogs and/or cats. Factors were age, sex and cat vs dog owners vs owners of both cats and dogs as factors. Again, there were no significant main effects or interactions.

However, a three way Analysis of Variance on the total hardiness scores amongst pet owners only, with age, sex and whether the pet was the subjects own pet or not as factors, showed a significant main effect of 'own pet' on hardiness scores. Subjects

who regarded a pet as their own had significantly lower hardiness scores (mean = 52.2) in comparison to those who regarded a pet as a shared or family pet (mean = 57.4, $F(1,89)=8.901$, $p=0.004$) . Intriguingly these findings are contrary to the expectation that pet owners may exhibit higher hardiness scores overall, and perhaps especially if the pet were considered the subjects own since pet ownership may require a degree of personal commitment as well as representing an ability to control events associated with pet ownership and /or a challenge involved in owning a pet.

In summary, for this sample, pet ownership does appear not to be related to hardiness. For pet owners who regarded the pet as particularly their own (i.e sole or especial ownership) scores were observed to be below the median for hardiness scores, indicating that these subjects may be catgorisable as low hardy individuals. Thus there is no evidence that individuals who are high-hardy are more likely to be pet owners.

Pet ownership and hardiness in relation to self-perceived health and fitness, and health behaviours.

These factors were analysed using a four-way Analysis of Variance with sex, age, hardiness level (high/low) and pet ownership as factors. The factor of pet ownership had three levels (cat/dog vs other pets vs non-owners). For some dependent variables, additional analyses were carried out using an extended pet ownership category (cat owners vs dog owners vs owners of both cats and dogs vs other pets vs non-owners) for example when analysing variables such as exercise rates where dogs owners may be expected to take more frequent exercise than owners of other pets. Because of small group sizes, this analysis was less powerful and thus not optimal for use as a primary analysis.

Subjects were asked to rate their health as either poor, having a few problems, fair, good or excellent. These ratings were subsequently converted to a score of one to

five, with higher scores indicating higher self-perceived health. Higher levels of self-perceived health was found to be significantly associated with hardiness level as might be expected ($F(1,161)= 27.014, p<0.005$) but not with pet ownership, sex or age. High hardy subjects' mean rating of health was 4.061 (good to excellent) as compared with 2.896 (fair to good) for low hardy subjects.

There was a significant interaction between hardiness level and pet ownership ($F(2,161)=7.347, p=0.001$). The nature of interaction is shown in Table 4.1. Among the owners of species other than cats or dogs, high hardy subjects reported significantly higher rates of self perceived health than low hardy subjects. A similar, although less pronounced, pattern was evident amongst owners of cats and/or dogs, but not amongst non-owners.

	Low hardy	High hardy	t	p
Cat/dog owners (N=89)	3.2	3.9	t (87)=2.7	0.007
Owners of other species only (N=17)	2.1	4.4	t (15)=5.7	< 0.0005
Non Owners (N=75)	3.4	3.6	t (73)=0.34	n.s.

Table 4.1: Mean ratings of self- perceived health by pet ownership category and hardiness level.

In view of the previous findings that hardiness scores amongst pet owners were significantly related to whether they regarded their pet as their own or shared with other family members, the above analysis was repeated for pet owners only, with ownership (yours/shared) as a factor replacing the factor of pet ownership category. Whilst high hardiness level again was associated with higher ratings of self-perceived health (means 4.079 for high hardy subjects, 3.138 for low hardy subjects,

$F(1,86)=14.070$, $p=0.005$), the factor of whether a pet was regarded as personally owned or not was not significant ($F(1,86)=0.141$, $p=0.708$).

Pet ownership and hardiness in relation to fitness and exercise

Subjects were asked to assess their personal fitness on a scale of poor, fair, good or excellent, this subsequently being converted to a score of one to four. A four-way Analysis of Variance on self-perceived fitness ratings, with age, sex, hardiness level and pet ownership as factors, showed no significant main effects or interactions.

There was a tendency for high hardy subjects to report higher rates of fitness (mean 2.557) than low hardy subjects (mean 1.956) but this was not significant.

Subjects were asked to indicate how frequently they took regular exercise i.e. never, less than once a week, weekly, 2/3 times a week or daily. These ratings were converted to a score of 0 for no regular exercise to 4 for daily exercise. No significant main effects of age, sex, pet ownership or hardiness level were found but there was a significant interaction between age and hardiness level. High hardy subjects in age groups 17-25 and 26-35 years took more exercise than their low hardy counterparts, although low hardy subjects in age group 36-45 reported slightly more exercise than high hardy subjects of the same age group. Greatest differences between groups were that for age group two (26-35 years) in which high hardy subjects exercise frequencies were a mean of 2.239 (more than 2/3 times per week) as compared to low hardy subjects of the same age for whom exercise rates were 1.055 (marginally more than one a week)

A subsequent analysis was performed to examine any differences in exercise frequency between cat owners and dog owners, since it might be expected that dog owners would take more exercise. Pet categories in this analysis were dog owners, cat owners (with or without other species owned), owners of both, owners of other species only, and non-owners. There was significant main effect of type of pet owned

on exercise frequency scores ($F(4,150)=6.449, p<0.005$). Owners of dogs reported a mean exercise frequency score of 2.649 (over 2/3 times per week) in comparison to cats owners (mean score 0.881, less than weekly) Somewhat surprisingly non owners reported higher exercise frequencies (mean 1.793) than owners of both cats and dogs (mean 1.526) and owners of pets other than cats or dogs (mean 1.263).

A significant interaction was found between sex and pet ownership ($F(4,150)=2.969, p=0.021$). The nature of this interaction is shown in Table 4.2. Male subjects who owned both cats and dogs took considerably less exercise than female subjects who owned both cats and dogs. Male owners of dogs only took most exercise of all although male non-owners showed higher rates of exercise than all other male categories of pet owners except dog owners and all female categories of pet owners except female owners of both cats and dogs. An examination of whether a pet was regarded as personally owned or shared showed no effect on exercise frequency scores.

	Males	Females
Both cats and dogs	0.87	2.18
Cats only	1.01	0.75
Dogs only	3.44	1.86
Other species only	0.95	1.58
Non -owners	2.00	1.59

Table 4.2: Exercise frequency by sex and pet ownership

Pet ownership and hardiness in relation to smoking, drinking and diet

Subjects were asked to indicate whether or not they smoked cigarettes and, if so, the level of daily consumption in terms of cigarettes per day. Neither hardiness level nor pet ownership was related to whether subjects smoked cigarettes or, amongst smokers, to the amount that they smoked.

Subjects were asked to indicate their rate of alcohol consumption per week in the following categories : non-drinker; up to 3 pints of beer or 6 units of spirit per week; up to 7 pints or 14 units of spirit; up to 12 pints of beer or 24 units per week; or over this amount per week. Scores were converted to 0 for non-drinkers to 4 for drinkers of over 12 pints of beer or 24 measures (units) of spirits per week. Analysis revealed a main effect of sex only ($F(1,161)=13.750$) with male subjects drinking significantly more alcohol per week than female subjects (mean 2.202, slightly more than 14 units of alcohol per week for male subjects, mean 1.163, slightly more than six units of alcohol per week for female subjects).

There were no significant effects of age, sex, hardiness level or pet ownership on consumption or frequency of consumption of takeaway foods. Membership or frequency of attendance of social clubs or societies was not related to age, hardiness or pet ownership. Males subjects were significantly more likely to attend social clubs than female subjects ($F(1,144)=4.386$, $p=0.038$).

Pet ownership and hardiness in relation to sleep patterns

Subjects were asked to indicate their patterns of sleep at times of no or relatively low stress and at times of work or other pressures. A repeated measures Analysis of Variance on the two sleep patterns was performed with age, sex, pet ownership and hardiness level as factors. There were no main effects between subjects of sex, age, hardiness level or pet ownership, nor any significant interactions. Within subjects analysis revealed a significant difference for all subjects between their sleeping patterns at times of no stress and their sleeping patterns at times of feeling stressed ($F(1,157)=33.376$, $p<0.005$). Mean scores for sleep patterns were 1.984 (very regular/quite regular) at times of little or no stress and 2.263 (quite regular to quite changeable) at times of work or other stressors. Pet ownership, age, sex and hardiness level did not exert significant differences on these sleep changes.

Life choices

Subjects were asked to consider eleven areas which people may consider important to their lives. These were marriage or a permanent relationship, travel, children, owning their own home, friends, having a demanding job, a highly paid job, a satisfying job, sport, keeping up current interests and owning a pet of their choice. Subjects were asked to indicate on a scale of 0 (no importance whatsoever) to 5 (extremely important) how important they rated each of these.

A four-way Analysis of Variance on the score for each of these eleven areas was performed, with age, sex, hardiness level and pet ownership category as factors. The results are summarised in Table 4.3. The importance of the majority of the various life choices did not differ significantly between pet owners and non-owners, or between high hardy subjects and low hardy subjects. Age and sex differences were noted for subject's importance rating for children, with female subjects and subjects aged 36-45 years rating these as significantly more important. This is perhaps to be expected since most subjects of this age had children of their own. The importance of having friends and a social life also yielded main effects of age and sex, being more important to female subjects and subjects in the youngest age group (17-25 years).

There was a main effect of hardiness only in the ratings of life choices of having a satisfying job and maintaining current interests. For both, high hardy subjects rated these as more important than low hardy subjects.

Regarding the importance of pet ownership, current owners of cats and dogs (but not owners of other species only) rated this more highly than non-owners. This is perhaps not surprising. Pet ownership was also significantly more important in the ratings given by younger subjects (17-25 years) than to subjects in the other two age groups. Somewhat surprisingly, low hardy people rated pet ownership as more important than

	Pet ownership group						Sex		Age			Hardiness level	
	cat/dog owners N=89	non pet owners N=75	other species N=17	male N=73	female N=108	F(1,161)	age1 N=56	age2 N=78	age3 N=47	Low hardy N=91	High hardy N=90	F(1,161)	
Marriage/ partnership ¹	3.13	3.43	3.37	0.32	2.96	3.60	2.78	3.05	3.13	3.67	0.86	3.22	0.09
Children	3.06	3.15	3.47	0.25	2.70	3.75	6.33 *	2.62	2.86	4.20	4.67 *	3.23	0.00
Buying house/flat	3.38	2.56	2.28	0.78	2.38	3.10	0.53	2.53	1.99	3.70	1.13	2.86	0.06
Sport ¹	3.40	3.07	2.31	0.39	3.50	3.35	1.50	3.31	2.91	2.57	0.16	2.23	2.06
Owning a pet	2.10	0.67	1.55	14.82 ***	1.31	1.57	0.52	2.11	1.01	1.20	3.37 *	1.82	4.19 *
Demanding job ²	2.42	2.34	1.60	1.67	1.99	2.24	0.60	2.07	1.95	2.33	0.53	1.86	2.37
Highly paid job	3.31	3.07	2.25	2.89	2.83	2.92	0.08	2.88	2.63	3.12	0.89	2.76	0.46
Satisfying job	4.59	4.33	4.23	1.70	4.35	4.42	0.10	4.34	4.37	4.44	0.06	4.12	5.45 *
Travel	2.82	2.85	2.72	0.05	2.79	2.80	0.00	3.05	2.41	2.92	2.04	2.88	0.27
Friends/ social life	3.99	4.12	4.20	0.44	3.85	4.35	4.98 *	4.53	4.00	3.78	3.06 *	4.20	0.66
Current interests	3.52	3.49	3.28	0.20	3.58	3.28	1.19	3.30	3.24	3.75	1.29	3.09	5.71 *

¹Error df=160 because of missing data ² Error df=159 because of missing data * p<0.05 ** p<0.01 ***p<0.001

Table 4.3: Main effect means from ANOVAs on life choice ratings, adult sample.

high hardy people, counter to the original hypothesis that high hardy people may be more likely to own pets than low hardy people, with implications for explaining the association with health advantages. However, it should be noted that the importance of pet ownership was low across all groups, with the owners of dogs and/or cats rating this as slightly important, and owners of other species as having minor importance. On average, non-owners rated pet ownership as having less than minor importance in their life.

The only significant interactions were found in relation to the importance of having a highly paid job. A significant hardiness x sex interaction ($F(1,161)=4.05$, $p=0.046$) was found due to high-hardy female subjects rating this as more important than low-hardy female subjects (mean scores 3.257 and 2.584 respectively). The means for high-hardy and low-hardy males were very similar being 2.7 and 2.9 respectively.

There was also a near significant main effect of pet ownership on the importance attached to having a highly paid job ($F(2,161)=2.891$, $p=0.058$) with owners of dogs and/or cats attaching most importance (mean score 3.307, quite to very important) and owners of other species of pet rating this only slightly important (mean 2.253). A near significant interaction between age and pet ownership ($F(4,161)=4.047$, $p=0.056$) indicated that, in the two younger groups, owners of pets other than cats and/or dogs attached lower importance to having a highly paid job than non-owners or owners of cats and/or dogs, but the older group attached higher importance (table 4.4). Highest importance was indicated by younger owners of dogs and/or cats.

age group	dogcat	none	other
17-25	3.8	3.6	1.2
26-35	2.9	3.1	1.9
36-46	3.2	2.5	3.6

Table 4.4: Mean ratings of importance of a highly paid job by age group and pet ownership category.

To examine whether the importance of pet ownership was related to the importance ratings for other life choices a matrix of correlations among the life choice ratings was computed. As can be seen from table 4.5, there were significant correlations between many of the life choices that might be intuitively thought to be related. Ratings of life choices regarding home and family life (e.g. a permanent relationship, owning one's own home, and children) are significantly correlated. Similarly those that could be described as job related (having a well paid job, a demanding job and a job that gives satisfaction) are also significantly correlated. The importance of travel was significantly associated with job related choices, perhaps because subjects regarded this as part of the demands of many jobs. Recreational life choices such as friendships and social activities and maintaining current interests were significantly correlated with one another.

Neither pet ownership group nor hardiness level appeared to be associated with many of the life choices. Hardiness level was significantly correlated only with two job related choices - high hardiness people gave higher ratings to having a demanding job and having a satisfying job. This is consistent with the assumptions of commitment and welcoming a challenge that underlie hardiness as a concept. Hardiness was not correlated with ratings of importance of pet ownership.

	Marriage/ partnership	Children	Buying house/flat	Demanding job	Highly paid job	Satisfying job	Travel	Sport	Current interests	Friends/ social life	Owning a pet	Hardiness (high/low)
Marriage/ partnership	1.00											
Children	.37**	1.00										
Buying house/flat	.18*	.21**	1.00									
Demandin g job	.08	.01	.22**	1.00								
Highly paid job	-.04	.04	.13	.42**	1.00							
Satisfying job	.07	.09	.08	.36**	.42**	1.00						
Travel	.19*	.08	.03	.21**	.33**	.21**	1.00					
Sport	-.15*	-.17*	-.08	.04	.01	.06	.09	1.00				
Current interests	.03	-.01	-.04	.09	.18*	.23**	.28**	.17*	1.00			
Friends/ social life	.02	-.10	-.02	.16*	.21**	.26**	.27**	.11	.24**	1.00		
Owning a pet	-.04	-.08	.08	.11	.20**	.07	.14	-.09	.08	.16*	1.00	
Hardiness (high/low)	.04	.00	-.08	.18*	-.03	.19*	.01	.14	.09	.04	-.06	1.000

*P<0.05 ** P<0.01 (2-tailed)

Table 4.5: Pearson correlations among life choice ratings and hardiness level (high versus low).

Ratings of pet ownership as a life choice correlated only with the importance of having a highly paid job and friendships. This was somewhat surprising since it was thought that if pet ownership were to be associated with any of the life choices it would be more likely to be related to home and family choices. Rather pet ownership stands out as the one life choice that has little relationship to any of the others.

Discussion of these findings will follow the second part of the study which examines hardiness, current pet ownership and importance of future pet ownership in a student sample

4.3 Hardiness, health and future pet ownership in a student population (study 3)

The first study into hardiness as a possible factor that could associate both health outcomes and the likelihood of pet ownership examined a sample who had already taken the decision to own, or not own, a pet. A further study was conducted to investigate whether hardiness in a younger, currently non pet owning sample was associated with health, health behaviours and the future likelihood of pet ownership.

4.3.1 Method

Subjects were 156 first year psychology students undertaking compulsory classes in practical research methods. The questionnaires were administered as part of demonstration class in questionnaire design and analysis taking place in the latter part of their first term at the university. Data was collected from first year students in two successive years.

All subjects were asked to complete the DRS-30 to assess hardiness and the Healthy Living Survey used in the first study. The Healthy Living Survey was modified in a minor way so that the section investigating importance of life choices such as

marriage, employment pet ownership etc. reflected the importance that students expected to attach to them over the next ten years. This was to enable examination of whether anticipated life choices were related to each other and/or related to hardiness or current pet ownership.

In addition to these instruments, two checklists of physical symptoms and psychological symptoms were administered to investigate the prevalence of stress-related symptoms that may be associated with life changes such as being a new a student at a university. The checklists have been used extensively within the university in a variety of studies examining stress related symptomatology, including bereaved groups, police officers dealing with road traffic accidents, nursing staff in emergency units, staff working with juvenile offenders, and student stress. The checklists have shown a high degree of reliability yielding alpha coefficients in excess of 0.95.

The checklists required students to indicate whether they had experienced a number of physical and psychological symptoms and, if so, whether this had occurred with greater or lesser frequency since coming to university. In this way stress related symptoms associated with the life change of becoming a new student could be assessed.

There were 156 subjects in this sample. All were aged between 18 and 25 years. Male subjects were much in the minority (N=38, 24%) reflecting the norm for student intake for psychology courses. Female subjects numbered 118 (76%).

A large number of subjects came from pet owning families. Less than one third (31.5%) did not have pets in the family home. Fifty-six percent had cats and/or dogs, with or without other species of pet, in the family home and 12.5% owned only pets

other than cats or dogs. These included rabbits, hamsters, rats, mice, goats, ducks, horses, reptiles and some insects.

Treatment of results

All first year psychology students in years 1995 and 1996 completed the set of questionnaires and checklists. However, since the sample required was that of the typical student age, mature students over 25 years were excluded from the sample. As with the previous sample, subjects having missing data for more than three items of the hardiness scale were excluded from the analysis. The very large majority had no missing data from the questionnaires. For those with three or fewer items missing from the hardiness scale a pro-rata total score was calculated in the same way as for the sample in Study 1. The median score for hardiness was calculated and used to assign subjects to the high-hardy group or the low hardy group.

Pet ownership was assigned as in the first study and the Type A study, being three categories: no pet owned, dogs and/or cats, and other species only. The extended categorisation of no pets, cats/no dogs, dogs/cats, both dogs and cats, and other pets only was also used for some analyses.

Two forms of analyses were performed on the student sample. The first mirrored the analysis of the first study in investigating for associations between hardiness, health and current pet ownership. The second focused on the importance of future pet ownership as indicated by responses on the life choices section of the Healthy Living questionnaire. Subjects rating future pet ownership as having no importance or very minor importance were assigned to a low importance group; subjects rating future pet ownership as being slightly or quite important were assigned to a medium importance group, whilst subjects indicating that future pet ownership was very or extremely important were assigned to a high importance group. This was then used as a factor in subsequent analysis in addition to the factor of current pet ownership.

Since all students were of the same age group, subject age was not used as a factor in the analysis of the student sample.

4.3.2 Results

Cronbach's alpha coefficients calculated for each of the subscales comprising the hardiness scale were similar to those found in the first study (commitment = 0.69; control = 0.49; challenge = 0.56). Once again these were considered to be unsatisfactory and were combined to give a total hardiness score which yielded a more satisfactory reliability coefficient of 0.70.

Total hardiness scores

A two way Analysis of Variance was conducted on the total hardiness scores with current pet ownership and sex as factors, to determine whether pet owners demonstrated significant differences in their hardiness scores. This yielded no significant main effects or interactions, indicating that neither pet ownership nor sex exerted any influence on subjects hardiness scores.

When the factor of whether a pet was regarded as the subject's own was included in the analysis there were no significant effects in hardiness scores. This was unlike the first sample. However, subjects who did regard their pet as personally owned did report slightly lower mean hardiness scores (56.194 for owners not seeing the pet as their own, as compared with 54.647 for those that did regard the pet as their own). This difference is in the same direction as in the sample in the first study.

Self perceived health, fitness and exercise

Self perceived health was calculated by the same method as in Study 1. A three-way Analysis of Variance on the self perceived health ratings was performed with sex,

current pet ownership and hardiness level as factors. There was a significant main effect of hardiness level on subjects' ratings of their self-perceived health ($F(1,146)=5.986, p=0.016$) with high hardy subjects reporting a mean score of 3.723 and low hardy subjects a mean of 3.235. There was no significant effect of current pet ownership on health. No interactions were significant.

There were no significant effects of sex, pet ownership or hardiness level on subjects' assessment of their personal fitness or on the frequency of exercise taken.

Alcohol, tobacco and diet

Three way Analyses of variance were conducted for each of the three behaviours with sex, pet ownership and hardiness level as factors. Males consumed significantly more alcohol than female subjects ($F(1,146)=28.998, p<0.005$). Male subjects reported a mean alcohol consumption of over 12 pints of beer (24 units of alcohol) per week while female students reported a weekly mean of between 6 and 14 units of alcohol consumed. There was no significant effect of either pet ownership or hardiness level. Few subjects smoked cigarettes, with only 23 subjects of the total of 156 reporting that they smoked. However, there was a significant interaction between sex and hardiness level ($F(1,142)=4.985, p=0.027$) with low hardy male subjects reporting significantly more cigarettes smoked per day. The frequency of takeaway or convenience foods consumed per week was not effected by sex, pet ownership or hardiness level.

Membership and of clubs and societies.

There were no significant effects of sex, pet ownership or hardiness level on the membership or attendance of social clubs or societies.

Changes to sleep at times of stress

Subjects were asked to indicate their sleeping patterns at times of little or no stress and at times when they were experiencing stress or pressure. A three way repeated measures Analysis of Variance was performed on the two sleep scores with sex, pet ownership and hardiness level as factors. Within-subjects analysis showed a significant difference between sleep patterns when not stressed and sleep patterns at times of stress. Subjects reported greater irregularity of sleep during stressful periods ($F(1, 146)=40.982, p<0.005$). There were no interactions of pet ownership, sex or hardiness level with this within-subjects factor.

Physical symptoms

Subjects indicated a range of physical symptoms experienced since starting university. These included sleep disturbances, appetite and digestive problems, feelings of physical tenseness, skin rashes, colds and sore throats. There were a total of 30 items on the checklist, each scored on a scale of 0 to 5, so that the maximum score possible was 150.

A three way Analysis of Variance on physical symptom scores with sex, pet ownership and hardiness level as factors, showed no significant main effects, although low hardy people showed a mean physical symptom score of 64.512 compared with a mean of 54.154 for high hardy subjects. ($F(1,146)=3.18, p=0.08$)

A significant interaction between sex and pet ownership was found ($F(1,146)=4.808, p=0.010$). This pattern of means is illustrated in Table 4.6. Male owners of cats and/or dogs had a significantly lower mean physical symptom score of 47.4 when compared to the mean for male non owners (74.9) However, in female subjects, cat/dog owners reported higher scores for physical symptoms whilst non-owners reported the lowest scores.

Group	Males	Females
Dog/cat owners	47.4	61.5
Other species	60.0	57.1
Non-owners	74.9	55.0

Table 4.6: Mean scores for physical symptoms by sex and pet ownership group

Psychological symptoms.

A 29 item checklist contained symptoms commonly regarded as psychological reactions of stress, including intrusive thoughts, concentration problems, relaxation difficulties, feelings of worry, despair or panic, loneliness, isolation and anger. Each symptom was scored on a scale of 0-5 with a maximum possible score of 145.

A three way Analysis of Variance on the total psychological symptom scores, with sex, pet ownership and hardiness level as factors, showed a significant main effect of hardiness level ($F(1,146)=10.594, p=0.001$) with high hardy subjects reporting a mean psychological symptom score of 51.766 as compared to a mean of 72.337 for low hardy subjects. Although the interaction between sex and pet ownership was not significant, the same pattern was observed as in the analysis on physical symptoms, with male non owners showing a higher mean symptom score (70.529) than male owners of cats and/or dogs who demonstrated the lowest mean symptom scores (48.482). As before, female non owners achieved the second most favourable symptom scores (mean 58.984)

Combined symptom scores

An analysis on the combined totals for physical and psychological symptoms accentuated these findings. A significant main effect of hardiness level on total symptom scores ($F(1,146)=7.463, p=0.007$) showed high hardy subjects to have a

significantly lower combined symptom score (mean 105.920) than low hardy subject (mean 136.849).

There was a significant interaction between sex and pet ownership as illustrated in Table 4.7. Male owners of cats and/or dogs to report having significantly lower symptom scores (mean 95.9) than male non owners (mean 145.4) who consistently demonstrate the highest scores. As before, female subjects displayed a different pattern with non-owners reporting the lowest symptom scores.

Group	Males	Females
Dog/cat owners	95.9	122.3
Other species	123.0	127.6
Non-owners	145.4	114.0

Table 4.7: Combined physical and psychological symptom scores by sex and pet ownership group.

A further analysis of symptom scores was performed on data from pet owning subjects with the inclusion of the factor of whether the pet was regarded as their own or not. This yielded no significant findings on analyses of the combined total symptom scores from both checklists or for the total physical symptom scores. However, in the analysis of psychological symptom scores, there was a near significant interaction observed between pet ownership and whether the pet was seen as the subjects own. ($F(1,91)=3.834, p=0.053$). Owners of cats and/or dogs not regarded as personally owned reported lower psychological symptoms (mean 48.3) than owners of dogs and/or cats which were regarded as the subjects own pet (mean 65.9). Conversely, owners of other species which were not regarded as being the subjects' own pets reported higher psychological symptoms (mean 70.4) than subjects regarding these as their personal pets (mean 46.9)

Hardiness and future desire to own a pet.

A further analyses was conducted to examine whether hardiness was associated with a desire to own a pet in the future. As in the earlier analysis, hardiness was first treated as a dependent variable to investigate any differences between subjects who regard future pet ownership as important and those who did not. Total hardiness scores were not found to be influenced by sex, current pet ownership or the future desire to own a pet, indicating that the proposition that high hardy people may be more likely to choose to own pets cannot be supported.

The same sequence of analyses as in study 2 was conducted with sex, pet ownership and hardiness level as factors and, in addition, the inclusion of the factor of whether subjects attached importance to the ownership of a pet in the future. This factor had three levels, low, medium and high importance, derived from subject's responses to the question in the life choices section of the Healthy Living Survey. Current pet ownership was retained as a factor to ensure that this was partialled out of an effect of importance attached to future pet ownership. Only main effects are reported since the inclusion of the interactions could not be estimated due to small or zero cell sizes in the fully factorial design.

Hardiness level only was significantly associated with self-perceived health ($F(1,146)=7.756, p=0.006$). Again it was high hardy subjects who reported highest levels of self-perceived health. High hardiness levels also tended to be associated with higher ratings of fitness, although this was not quite significant ($F(1,145)=3.512, p=0.06$).

Exercise frequency was not significantly associated with hardiness level, sex, current pet ownership or desired future pet ownership when current pet ownership was used as a three level factor of cat and/or dog, no pets owned, and only species other than cats or dogs owned. When the expanded five level categorisation of cats/no dogs,

dogs/no cats, both cats and dogs, only other species and no pets was used, current pet ownership was found to be significantly related to the frequency that subjects took exercise. ($F(4,143)=2.613, p=0.038$). Highest levels of exercise were taken by subjects who owned dogs but no cats (table 4.8). However this did not differ significantly from owners of species other than dogs or cats who took almost as much exercise as dog owners. Lowest exercise frequencies were observed, somewhat surprisingly, in owners of both cats and dogs.

	N	mean
Both cats and dogs	11	1.28
Cats (nn dogs)	42	1.89
Dogs (no cats)	32	2.43
Other species (no cats or dogs	49	2.22
No pets	18	1.47

Table 4.8: Mean exercise frequency (0 to 5 scale) by current pet ownership.

As in the earlier analysis, alcohol consumption was only associated with the sex of the subjects ($F(1,146)=38.386, p=<0.005$) with males consistently reporting higher weekly consumption of alcohol than female subjects. Neither smoking behaviours nor membership and attendance of social clubs or societies was significantly associated with sex, current pet ownership, desired future pet ownership or hardiness level.

The consumption of takeaway or convenience foods was related to the sex of subjects, with male subjects reported more frequent consumption ($F(1,146)=8.073, p=0.005$). It was also related to the future desire to own a pet ($F(2,146)=3.719, p=0.027$) with subjects indicating medium importance attached to future pet ownership reporting significantly higher consumption of these foods.

Physical symptom totals, psychological symptom totals and combined symptom totals were found to be related to hardiness level only. Consistent with earlier analyses, high hardy subjects reported significantly lower levels of symptomatology than low

hardy subjects. This was significant with regard to psychological symptoms and combined physical and psychological scores, but not for physical symptoms alone, although a similar trend was observed. This is illustrated in Table 4.9

	High hardy	Low hardy
Physical scores	61.43	53.5
Psychological scores	50.4	70.9
Combined scores	103.9	132.3

Table 4.9: Symptom scores by hardiness level

Life choices

Student subjects were asked to indicate the importance they expected to attach over the next ten years (i.e. extending into the time when they would expect to be living independently and making their own decisions affecting their life) to eleven areas which could be loosely described as future life wishes. These were the same as described in the previous study, but addressed future choices rather than current choices.

Scores for each of the areas ranged from 0 (no importance at all) through to 5 (extremely important). A four way Analysis of Variance was performed on each of the life choice areas with sex, hardiness level, current pet ownership and future importance of pet ownership as factors. Since all subjects fell within the same age group, age was not a factor in this analysis. The main effects of the analyses are summarised in Table 4.10. Since future wish to own a pet was used as a factor in these analyses future pet ownership does not appear as a dependent variable in the table.

	Current pet ownership										Sex			Future importance of pet ownership						Hardiness level	
	cat/dog owners	non pet owners	other species	F(2,133)	male	female	N=115	F(1,133)	low	medium	high	Low	High	N=78	N=75	F(2,133)	hardy	hardy	F(2,133)	N=78	N=75
	N=86	N=49	N=18						N=84	N=49	N=20										
Marriage/ partnership	3.55	3.71	3.28	0.29	3.33	3.70	0.85		3.33	3.71	3.50	0.72	3.34	3.69	1.04						
Children	2.31	1.82	1.07	2.13	1.17	2.29	5.22 *		2.02	2.22	0.96	2.16	1.83	1.64	0.19						
Buying house/flat	3.69	3.62	2.39	3.41 *	2.74	3.73	7.50 **		2.87	3.41	3.41	2.13	3.02	3.45	1.93						
Sport	2.79	2.58	2.32	0.35	2.95	2.17	2.72		2.51	2.60	2.58	0.03	2.21	2.92	3.10						
Demanding job	2.51	2.54	2.92	0.29	2.65	2.67	0.00		2.50	2.66	2.82	0.31	2.78	2.54	0.54						
Highly paid job	3.25	3.21	2.61	0.93	2.98	3.07	0.08		3.01	3.05	3.02	0.01	2.81	3.24	2.19						
Satisfying job	4.53	4.12	4.31	2.72	4.13	4.51	2.90		4.36	4.26	4.35	0.19	4.06	4.59	8.02 **						
Travel	3.38	3.02	2.93	0.91	2.87	3.36	1.71		2.91	2.88	3.55	1.14	2.59	3.63	10.92 **						
Friends/ social life ¹	4.50	4.8	4.46	0.01	4.53	4.42	0.22		4.55	4.24	4.65	1.70	4.28	4.68	3.94 *						
Current interests	3.48	3.27	3.49	0.25	3.53	3.30	0.33		3.07	3.38	3.80	1.44	3.20	3.63	1.72						

¹Error df=132 * p<0.05, ** p<0.01

Table 4.10: Main affect means from ANOVAs on life choice ratings, student sample.

As in the analysis of the first study, it was found that few of the future life wishes of the student sample were influenced by their current pet ownership or their hardiness level. Subjects whose pets were only species other than cats or dogs rated future home ownership as less important than cat/dog owners and non-owners. Hardiness level influenced only the ratings of future importance of travel, having a satisfying job and having friends and a social life, with high hardy subjects rating these as significantly more important to their future than low hardy subjects.

The future importance of friendship and a social life was more important to high hardy subjects than to low hardy subjects, as indicated by a significant main effect of hardiness level ($F(1,132)=3.936, p=0.049$). A significant interaction between sex and hardiness level ($F(1,132)=6.533, p=0.012$) was due to low hardy male subjects attaching more importance to this area than high hardy male subjects. Female subjects reported similar levels of importance for this area regardless of their hardiness level. A near significant interaction between current pet ownership and future importance of pet ownership ($F(4,132)=2.418, p=0.052$) showed all groups to attach similar importance to home ownership except for owners of pets other than cats and/or dogs and who attached medium importance to future pet ownership who reported significantly lower importance attached to this area.

In a separate analysis with sex, hardiness level and current pet ownership as factors, Current pet ownership did not predict the importance of future pet ownership ($F(2,133)=1.786, p=0.172$), nor did hardiness level or subject sex. In fact, future pet ownership did not appear to be of high priority to many subjects, even those who currently owned pets. As can be seen in Table 4.11, future pet ownership assumes relatively low importance for all groups.

Future importance scale= 0-5	Dog/cat owners (N= 86)	Other pets (N=18)	Non owners (N= 49)
High >3	13	2	5
Medium 2-3	36	5	8
Low 0-1	37	11	36

Table 4.11: Number of subjects attaching importance to future pet ownership by current pet ownership status

When correlated, a number of the life wishes that would intuitively have some association are found to be significantly correlated, as shown in Table 4.12. Marriage/permanent partnership, home ownership and having children are all significantly associated with each other. Similarly, future wishes relating to aspects of employment are associated together in the same way observed in the first sample. Travel was associated with both friendships and with future employment in a satisfying job, perhaps indicating subjects' views of both work related travel and recreational travel. Sport and maintaining current interest were also associated, perhaps reflecting current sports interests common in students.

However, in contrast to the findings from Study 1, future pet ownership was significantly associated with home related life wishes of home ownership and permanent partnership or marriage, indicating that, to younger people, pets may be viewed as being part of home-making. Future pet ownership was also significantly associated with the importance of maintaining current interests and may reflect the views of subjects for whom pets are themselves a current interest.

Hardiness was significantly correlated only with the importance of having a satisfying job and with the importance of travel.

	Marriage/ partnership	Children	Buying house/flat	Demanding job	Highly paid job	Satisfying job	Travel	Sport	Current interests	Friends/ social life	Owning a pet	Hardiness (high/low)
Marriage/ partnership	1.00											
Children	.48**	1.00										
Buying house/flat	.25**	.29**	1.00									
Demandin g job	.09	.12	.16*	1.00								
Highly paid job	-.06	.16	.30**	.21**	1.00							
Satisfying job	.12	.16*	.18*	.27**	.21**	1.00						
Travel	-.02	-.01	.13	.07	.04	.21**	1.00					
Sport	-.03	.05	.12	.21*	.16*	.13	.09	1.00				
Current interests	.10	.01	.12	.11	.09	.10	.19*	.41**	1.00			
Friends/ social life	.11	.10	.20*	.08	.13	.28**	.14	.11	.01	1.00		
Owning a pet	.170	.07	.19*	.04	.10	.03	.04	.07	.18*	-.06	1.00	
Hardiness (high/low)	.02	-.15	.08	.08	.12	.21*	.32**	.13	.08	.11	-.07	1.00

*P<0.05 ** P<0.01 (2-tailed)

Table 4.12: Pearson correlations among future life choice ratings and hardiness level (high versus low)

4.4 Discussion

Both studies into the association between hardiness, health and pet ownership were undertaken to further investigate the proposition that reports of an association between pet ownership and health may be due to the influence of a third factor that influences both health and the likelihood of pet ownership.

Research into hardiness, as previously discussed, has demonstrated that high hardy people exhibit a resilience to stressful events which may afford protection from stress related illness. Hardy people are believed to be less likely to appraise some events as stressful; are more likely to believe that events are controllable and are more flexible and problem-focused in their strategies for coping with events. They are also more likely to take a positive view of their own attempts to cope with stressors and to feel less discouraged with initial failures. Combined with an overall view that change is both natural and inevitable, they are also more able to cope with life changes and regard these as challenges that can afford positive results rather than threats to their own security or the status quo. These abilities, whilst psychological in origin, may impact on physical health through the reduction of anxiety and depression, known to have physical consequences including the onset of illness.

The key questions are whether hardiness and pet ownership are related, and whether they, combined or separately, influence psychological and physical health.

The two studies support many of the claims for an association between hardiness and psychological and physical well-being. In the first study high hardiness was significantly associated with higher ratings of self perceived health and physical fitness. Health related behaviours such as the taking of regular exercise, smoking and consumption of alcohol, and social activities which may be regarded as affording stress-reduction through recreation, were not influenced by hardiness.

In the student sample, since the subjects had more time to complete the questionnaires and since they could be recruited at a time when they had been under identifiable stress (starting their university courses), it was possible to include symptom checklists for the investigation of stress-related health problems, both psychological and physical. Again, high hardiness was associated with better perceptions of physical health, although not physical fitness which is perhaps explainable by the youth of the sample. Scores on the symptom checklists were also found to be associated with hardiness level with high hardy subjects reporting an average score of 21 points less than low hardy subjects for psychological symptoms and 10 points less for physical symptoms. Health behaviours, as in Study 1, were not affected by hardiness.

Pet ownership was *not* found to be associated with hardiness. High hardy subjects were not more likely to be pet owners in either of the two study samples. Nor was the future importance of having a pet related with hardiness. Therefore, in this study, the proposition that high hardiness may lead to health advantages *and* the increased likelihood of owning a pet is not supported. Indeed, whilst hardiness could be reliably demonstrated to be associated with health outcomes, pet ownership was not found to exert any positive influences on health. Pet owners in both samples did not report significantly higher ratings of self-perceived health or physical fitness, nor, in the student sample, did pet owners report significantly lower psychological or physical symptoms scores. Only in rates of regular exercise taken was any beneficial effect of pet ownership found in Study 1 where dog ownership was associated with higher rates of exercise. However, subjects who owned both cats and dogs, and cats only took rather less exercise than non-owners.

Somewhat surprisingly, pet owners who stated that a pet was especially their own (as opposed to a family/jointly owned pet) were found to have significantly *lower* hardiness scores than pet owning subjects for whom the pet was not regarded as their

personal pet. This could not be dismissed by inspection of the number of subjects who lived alone and who would therefore naturally respond that the pet was their own. However, no further differences were observed between these two sub groups of pet owners in relationship to health and fitness.

A weak but consistent finding was that pet owners in Study 1 had slightly *lower* mean hardiness scores, self-perceived health scores and fitness ratings than non-owners. Low hardy subjects in this group were also more likely to rate pet ownership as more important than high hardy subjects. In the student sample, pet owners also had slightly lower hardiness scores and self-perceived health ratings. However, pet owners in this group did rate their level of fitness as marginally better than non-owners.

These differences were not statistically significant and formed only a weak pattern in the data. Thus it is possible that pet ownership is more associated with *low* hardiness than high hardiness, counter to expectations. Consistent with this was the finding that students who rated future pet ownership as having high importance reported small, but consistently higher, incidence of physical and psychological symptoms as measured by the symptom checklists. While these patterns are weak, they add weight to the conclusion that there is no association between pet ownership and high hardiness. Thus there is no evidence of hardiness acting as a common causal factor in the 'non-causal' model of the relationship between pet ownership and health.

Hardiness clearly shows itself to be related to health and health outcomes, with pet ownership having no such influence as a main effect. Pet ownership does, however, appear to interact significantly with the sex of a subject in health as measured by the incidence and intensity of physical and psychological symptoms. It would appear that male subjects who own cats and/or dogs are in some way less vulnerable to psychological and physical symptoms of stressful events than male non owners. This

difference is not apparent between female cat/dog owners and non-owners. Indeed, female subjects displayed a reverse pattern in their symptom scores to those of male subjects. Female dog/cat owners reported higher scores whilst female non-owners reported the lowest.

This may pose the question of whether particular groups of pet owners may derive special benefits. Anderson et al (1991) reported pet ownership as being of particular benefit to males over 40 years of age with regard to risk factors for cardiovascular disease. The findings from the student sample suggest that male owners of dogs and/cats may derive benefits not apparent in female owners. The present study indicates that any benefits to a particular group of pet owners is unlikely to be due to their level of hardiness as a personality characteristic which may influence health outcomes and likelihood of pet ownership. It is more probable that, should there be a case for special benefits accruing to particular pet owners (whether this be sex or age for example), this would be more readily explained via some mechanism other than a non-causal association, such as the nature of the relationship with the pet or the role of the pet in facilitating human relationships, and this is further discussed in the remaining chapters of this thesis.

The investigation of whether life choices were related to each other was undertaken to assess whether the option and importance of pet ownership could be seen as falling within an identifiable pattern of choices that, in turn, may be related to hardiness and, through this, health outcome. It was surprising to find that for both subject samples, pet ownership was correlated with few other life choices.

In Study 1, it could have been expected that pet ownership would correlate with factors involving the home and family, particularly in view of the frequent claim that pets are members of a family and/ or that pets make a house a home'. In fact, the importance of pet ownership correlated only with the importance of friends and

having a highly paid job, which were not related to each other. In the student sample, the importance of future pet ownership did correlate with anticipated importance of having one's own home and having a permanent relationship or marriage. It was also related to being able to maintain one's current interests.

A notable feature of the rating of pet ownership for both subject samples is the relative low importance subjects attached to it, even subjects who were current pet owners. Over half of the student sample (54%) indicated that future pet ownership had no importance, or very minor importance. Only 12% indicated that pet ownership would be very or extremely important to them. The life choice achieving the second lowest rating was that of sport, where 25% of students indicated that this had no importance or very minor importance and 23% that it would have high importance. The relative low importance of pet ownership was also mirrored by subjects of Study 1 in which 63% of subjects indicated that owning a pet was of no importance or only minor importance. It is concluded that pet ownership is not easily identified as falling within a group of life choices that may impact on health.

In summary, the two studies indicate that whilst high hardiness is significantly associated with positive physical and psychological health, it is not associated with pet ownership. Indeed, there are some weak indications that pet ownership may be associated with low hardiness. Therefore hardiness as an explanation for health benefits that may accrue from pet ownership cannot be supported. In fact, no significant associations between pet ownership and health were found in these studies, although pet owners were observed to report lower mean scores on the symptom checklists. This produces a rather contradictory picture of pet owners being slightly less hardy individuals, who do not rate their health or fitness as better than non-owners, yet do seem to suffer fewer (although not statistically significant) physical and psychological symptom where these were available for measurement. This may indicate that pet ownership can produce health benefits, although not in

ways consciously noticeable by the subjects themselves. Nor are these benefits (if present at all) explainable through hardiness as a third factor influencing both health outcome and the likelihood of pet ownership.

4.5 Summary of studies investigating the proposition of a non-causal association between pet ownership and health.

This section of the thesis examined one possible class of explanation for an association between pet ownership and health i.e. that any association may be non-causal in nature and that both pet ownership and health may be influenced by a third factor.

Two candidate factors were selected to investigate this possibility, a behaviour pattern or lifestyle, and a personality characteristic. The first, Type A behaviour, is widely believed to contribute to risk for cardiovascular disease and other stress-related illness. It was considered plausible that the characteristics of Type A behaviour - time urgency, ambition, impatience and intolerance or hostility - may also reduce the likelihood of pet ownership since this activity is time consuming, requires patience and is not conducive to material or personal gain. Nor does pet ownership appear to fit easily into the 'life in the fast lane' form of lifestyle assumed to be typical of Type A behaviour patterns. It was therefore hypothesised that subjects exhibiting high levels of Type A behaviour would be less likely to be pet owners. This would constitute a non-causal association between pet ownership and health in that a group with a high risk for health could be underrepresented as pet owners. Conversely, any association between pet ownership and health may be explainable through pet owners being representative of a lower risk for health group.

The second candidate factor, that of hardiness or dispositional resilience, illustrates another form that the non-causal explanation might take. Here, it was suggested that

hardiness, a personality characteristic that has a robust connection to health enhancements, may be associated with increased likelihood of pet ownership. This was considered plausible in that the components of hardiness - commitment, belief in one's ability to control events, and able to view changes as challenges with an expectation of positive outcome - have some face validity to attitudes of successful pet ownership. Thus, it was hypothesised that people displaying high levels of hardiness may constitute a population who would demonstrate both increased incidence of pet ownership and more positive health outcomes.

Although both candidate factors appeared to have good face validity as possible non-causal explanations for an association between pet ownership and health, in neither case was the non-causal model found to be supportable. Pet ownership was not under-represented amongst subjects with high scores for Type A behaviour. Indeed, pet owners, on the whole, tended to score more highly on the Type A schedule than did non-owners. Thus it would appear that pet owners may not be a lower risk for health population than non-owners. However, it should be stressed that the higher Type A scores for pet owners were mainly attributable to their responses on the questions relating to the desire to be busy and active, and for doing many activities at a time. There was no difference between pet owners and non-owners on questions relating to impatience and hostility, the components of Type A behaviour believed to most contribute to risks for illness. Since the analysis was unable to identify the four subscales claimed to be identifiable in the Type A schedule, no further analysis was possible. However, the study does appear to demonstrate that Type A behaviour - and therefore higher risk for health - is no less prevalent amongst pet owners than non-owners.

Similarly, hardiness as a personality characteristic shown to be associated with positive outcomes for health, was not demonstrated to be more prevalent amongst pet owners or amongst subjects who wished to own a pet. Hardiness was, as anticipated,

related to perceptions of health and, where physical and psychological symptomatology was examined, to self-reported health outcomes at times of stress. Pet ownership was not associated with hardiness nor was it significantly associated with health, although pet owners did tend to report lower symptom scores in the student population. Thus it may be that pet ownership can exert some influence on health outcomes but this is not explainable by pet owners being more hardy than non-owners. Indeed, it was observed that pet owners, and especially those who considered the pet as their own, may score lower on hardiness than non-owners. Similarly, low hardy subjects were more likely to indicate that pet ownership was important to them than high hardy subjects.

In conclusion, although the studies presented in this section do not provide firm evidence that pet owners demonstrate health advantages over non-owners, this strand of enquiry addressing the non-causal association model is nonetheless considered important. It provides a preliminary step in the construction of a body of research that takes seriously the need to respond to a popular scepticism that an association between pet ownership and health could be accounted for if only particular populations of people elect to own pets. It would appear that neither Type A behaviour nor hardiness offer an explanation for health advantages via a third factor influencing both health and pet ownership.

The studies into Type A behaviour and hardiness represent part of what should be a substantial area of research in the field of companion animal studies. Two approaches to such research are required. Firstly, if the claim that pet ownership has a causal influence on health is to stand, it needs to be adequately demonstrated that the health status of people newly electing to own pets does not significantly differ from people who do not. The classification of 'health status' should be broad enough not only to capture physical and psychological health at the time of deciding to own a pet, but also to identify lifestyle factors, the existence of particular stressful life events or

minor hassles that could influence the decision to own a pet (or not) and future health. A plausible view would be that people who have current health problems, or are experiencing stressful events or have lifestyles characterised by major or minor hassles are less likely to elect to own a pet *and* more likely to register physical or psychological problems on scales of measurement. So far, this issue has been largely ignored, but it has important implications. For example, in the Serpell (1991) study, although baseline measurements between the control subjects and the subjects acquiring pets did not differ significantly at the start of the study, no account is taken of life events occurring during the course of the study which may have contributed to the differences between the health outcomes of the experimental and control groups. In addition, if the control group contained subjects for whom minor stressful events tended to be more prevalent and/or more frequently occurring, this could account for them not electing to own a pet and to lower health ratings should these events re-occur during the study. From personal communication it would appear that this may be so, since subsequent re-analysis of the findings suggests that when stressful life events are taken into account the benefits apparently observed in the pet acquisition group are rendered non significant.

Secondly, where studies focus on existing pet owners (as opposed to people newly acquiring pets) it needs to be demonstrated that pet owners do not differ from non-owners in ways that may affect health outcomes. Continuation of pet ownership may itself depend on a lack of the sort of life events that may deter pet ownership such as financial problems, physical illness, frequent house moves or employment demands. Alternatively, pet owners may exhibit behaviour patterns and/or personality characteristics that more easily predispose them to owning an animal and to better health. This latter approach is taken by the studies presented in this section and, although they do not suggest that pet owners differ from non-owners in the ways investigated, they represent only two of the possible factors that need to be examined if claims for pet ownership and health are to be supportable. Other factors that may

influence health and pet ownership include dispositional optimism (Scheier & Carver, 1987), hostility and anger (Engelbreton, Matthews & Scheier, 1989), internal vs external locus of control (King, 1982) and factors relating to coping styles for dealing with life change (Lazarus & Folkman, 1987). Whilst it is probably unnecessary for an exhaustive investigation of all such factors to be undertaken, it is considered that substantial evidence is still required to demonstrate that pet owners do not differ in lifestyle, personality characteristics or in the number of life changes or stressful events experienced in comparison to non-owners. As yet, sufficient evidence of this nature does not exist to the extent that a non-causal association can be dismissed.

SECTION 3
INDIRECT CAUSAL ASSOCIATION

Chapter 5: Dogs as Catalysts for social interaction

The second class of explanation, indirect causal, has its origins in two separate areas of research. The first is the work that demonstrates that pets, especially dogs, are able to act as social catalysts, facilitating human-human interactions. The second is the research that indicates that physical and psychological health may be influenced by the presence or absence of adequate human social networks. Bringing the two bodies of research together, the question arises whether pets can act as social catalysts to the extent that they enhance the quantity and quality of human-human interactions sufficiently to have an indirect effect on health via increases (quantitative and/or qualitative) in human contact.

This class of explanation is referred to as an *indirect causal association* since it is not the ownership of a pet *per se* that acts as a mechanism for enhancement to physical or psychological health, rather it is the contribution of the pet in facilitating human interactions, any influence to health being primarily attributable to the human contact, either in the form of casual positive interactions or the beginnings of more permanent friendships, and the functions served by these human contacts.

5.1 Relationships, networks and health

The importance of social relationships to psychological and physical well-being is well-documented. House, Landis and Umbertson (1988) distinguishes between aspects of relationships at the structural and functional levels using the following scheme:

- a) The existence of an identifiable social network which may be made up of a variety of relationship types but which gives a sense of embeddedness in a community or network and acts against feelings of loneliness and isolation;

- b) The nature of the composition of a social network - how it is made up of family members, friends, acquaintances, and the duration of these relationships- influences people's self identity and roles played within a network, and expectation of others behaviour toward them;
- c) The functional content of relationships and how relationships may provide costs and/or benefits. Functional content may be characterised by provisions of help, intimacy, social support, companionship or conflict and demands placed by particular relationships.

Whereas the first two aspects of relationships are primarily structural and the third functional, each of these has attracted research into how relationships may influence health. At the level of the existence of a social network, absence of an adequate identifiable network is equated with loneliness and isolation. Loneliness is associated with higher risk of physical and psychological morbidity. Vaux (1988) distinguishes between social and emotional loneliness. Social loneliness refers to an impoverished or absent social network, whereas emotional loneliness refers to the absence of particular types of close relationship in a network such as friends or family members who can provide a sense of emotional security. Samter (1994) also takes up this theme in her examination of lonely people. She reports that many lonely people do not have impoverished social networks, rather they lack specific close relationships. This may arise through absent family connections or through inadequate social skills to form close relationships. Shyness, low self-esteem, poor communication skills and inability to perceive potentially developing relationships hinder the formation of close relationships and leave social networks predominantly characterised by an absence of close relationships, even those these networks may, numerically, appear adequate.

The importance of the presence of close relationships as been extensively researched by Derlega, Metts, Petronio & Magulis (1993) and Henderson (1992), both of whom report a higher incidence of depression, anxiety and physical illness in people close

relationships. It would appear that even for people with relatively sparse networks, in numerical terms, it is the perception of lacking specific relationships that is most linked with adverse health outcomes.

The link between absence of close relationships and risk to physical and psychological health may be explained through the functions that these particular relationships afford. For Derlega et al and Henderson a critical element is the availability of a confidant, a trusted relationship in which to confide problems and offer help. Weiss (1974) points to the 'need to be needed'. Other researchers (e.g. Taylor & Altman, 1987) emphasise the reciprocity of relationships and their associated relational obligations. However, these functions can be seen to be encompassed by a much wider concept, that of *social support*. Although often loosely used as a term to describe a variety of rather general feelings arising from relationships, the concept has a history of research which specifically focused on how relationship functions can impact on health.

The origins of research into social support can be traced to two separate seminal papers. Taking as their starting points a question of why some people appear to suffer adverse responses (such as anxiety and physical illness) to stress whilst other people do not, the major focus centered on social relationships. For Cassell (1976) the important element was "meaningful social contact" and the presence or absence of social relationships. His emphasis on social contact can be seen to be the foundation of later research into size, composition and frequency of contact of social networks and their impact on well-being. Cobb (1976), focused on the 'meaningful' element of this proposal and examined the functions provided from social relationships, defining social support as the process whereby interpersonal transactions afford 'information leading the subject to believe he is cared for and loved, esteemed, and a member of a network of mutual obligations.' Thus social support was seen the provision of goods,

services and emotional resources at times of need, and it is regarded as an important coping resource which can alleviate the adverse effects of stressful events.

Cobb proposed four components of social support:

- 1) Emotional support - the expression of caring and concern for a person, giving provision of comfort, reassurance and a sense of belongingness;
- 2) Esteem support - the expression of positive regard to the person, reaffirming self-worth, confidence and competence in the face of a threat to self-esteem;
- 3) Tangible/instrumental/ practical support- the direct assistance to cope with a problem or task;
- 4) Informational support - advice, feedback, information, to help in the person's assessment of appropriate action.

Cobb believed that social support derived from social relationships can provide protection from anxiety and depression and related illness, and could accelerate recovery from illness through fostering positive regard and practical help. This belief has been supported by later research into the mortality and morbidity associated with coronary heart disease (Eriksen, 1994); recovery from surgical procedures (Kulik & Mahler, 1989); incidence of depression (Henderson, 1992) and the maintenance of more general psychological well-being under stress (Winefield, Winefield, & Tiggemann, 1992).

The components of social support, as described by Cobb, highlight the potential roles that different relationships play in physical and psychological health. Whereas emotional support may be primarily associated with close relationships that offer availability of a confidant, other, less intimate, relationships may provide esteem support or practical or informational support. Whilst pets themselves have been proposed to fulfil many of the functions of close social relationships and could, therefore, potentially provide some of the benefits associated with social support, this

section is primarily concerned with the availability of human social support/ social contact and whether this may be enhanced through pets catalysing social interactions between people. The possibility that pets may be able to directly provide social support is discussed in section 4 of the thesis.

5.1.1 Pets as social catalysts

The investigation into the role of pets as social catalysts brings together the views of both Cassell and Cobb in that it focuses on the importance of social contact with a network and the functions of the relationships within the network. If pets can act as catalysts for social interaction they may provide the meaningful social contact deemed important by Cassell. If those contacts give rise to relationship provisions associated with supportive functions they may be viewed as providing social support within the definitions outlined by Cobb. Thus it becomes important to investigate the ways in which pets may enhance social networks and whether these enhancements lead to supportive relationships which may impact on health.

As discussed in Chapter 1, the studies investigating the social catalysis effect of pets have principally fallen into one of two types. Either they have examined the effect of being with a dog in what could be regarded as dog-walking areas (Messent, 1982), or they have assessed the improvement in social integration or acceptance of people with disability when they have a service dog present (Eddy, Hart & Boltz, 1988). Although these studies have made claims for improvements in feelings of psychological well-being arising from increased social contact, studies of this nature have not explored whether increased human interaction could have an influence on physical and psychological health. Yet, if the catalysis effect of pets (or specifically dogs) is robust, it could lead to quantitative and/or qualitative enhancements to the owners' social networks and, through this, to health benefits. Casual encounters could enhance a sense of network embeddedness in the sense referred to by Cassell. They could

develop into more substantial social relationships, with shared interests and activities beyond pets. Such relationships might well be a source of relationship-based social support as outlined by Cobb. Furthermore, since the experiments suggest that the dogs can act as an 'ice breaker', few social skills are required to initiate interaction.

5.1.2 Can pets bring health benefits as an indirect effect of social catalysis?

To address this question, two levels of investigation are required. Firstly, it is necessary to establish that pets (in this case dogs) can reliably be regarded as effective social catalysts for the majority of dog owners - not just those meeting in parks, or belonging to a particular group of dog owners i.e. service dog owners. Secondly, any such enhancements to social contact with other people must be demonstrated to be potentially of a nature that could positively influence health.

To address the first point, the existing studies require considerable refinement. For catalysis to be regarded as a robust phenomenon it needs to be demonstrated that it is effective outside conventional dog walking areas such as parks and that it can be experienced by all, or most, dog owners. If the proposition forwarded by Lockwood (1983) that pets enhance the perception of the owner by others, making him/her more approachable, is also to be evoked -as often cited in studies demonstrating dogs as social catalysts - then investigations need to examine the alternative explanation that it is not the behaviour of the dog itself in seeking attention that causes the increase in interactions. Moreover, if the 'Lockwood' effect is strong, it could be argued that even people whose appearance or demeanour may be unprepossessing should experience more interactions when in the company of a dog. Thus there is a real need to investigate the extent to which the catalysis effect extends to people of greater or lesser attractiveness.

Regarding the second issue, that increased interactions should be shown to be of a nature that could have a potential positive effect on health, studies to date have focused only on the number of interactions experienced. If these are truly to be related to health or psychological well-being, it is necessary to extend the investigation to the nature of the interactions and the relationship with the interactee.

The empirical work presented in this section seeks to explore both of these issues.

The first two studies are concerned with testing the robustness of the social catalysis effect of dogs, whilst the third explores the relationship between pet ownership and the content and function of relationships with other people that arise through pet ownership.

5.2 A dog as an agent of social facilitation in an everyday context (study 4)

5.2.1 Introduction

This study seeks to refine and extend the work of Messent (1982). Its main aim is to test the robustness of the catalysis effect experienced by dog owners. Although adopting the same principles as those in Messent's study i.e. the recording of numbers of interactions experienced by the handler, the following refinements were introduced.

a) The experimental situation was not confined to conventional 'dog walking areas' such as parks or recreation grounds. Rather these areas were excluded from the study so as to minimise the effect of dog walkers meeting one another. Instead, the dog accompanied the experimenter in all daily routines such as accompanying her to take children to school, to her work at the University, on public transport etc. In this respect the routines were similar to those of a service dog, although there were no

contexts that were so unusual so as to produce a novelty effect because it would be highly unusual to encounter a dog.

b) The dog used for the experiment was a dog undergoing the final stages of training as a Guide Dog for the Blind. She had been schooled not to solicit attention from people and to make herself as inconspicuous as possible. This measure was taken to ensure that any increase in interactions was not as a result of the dog making friendly overtures to passers-by or seeking attention in other ways.

c) The experimenter ensured that she did not greet people or engage in behaviour likely to be interpreted as initiating interactions.

d) Interactions were noted not just for their number and length as in the Messent study, but also who the interaction was with, for example whether they were friends, acquaintances or strangers.

5.2.2 Method

The dog selected for the experiment was a young adult cross-bred Labrador bitch owned by the Leamington Guide Dog Training Centre. The experimenter was well-acquainted with the dog having conducted training assessments of the dog during its puppy walking period. The dog was therefore willing and accustomed to 'work' for the experimenter. The dog wore a plain collar and lead so as not to be identifiable as a guide dog. This particular dog was chosen for her quiet nature, her unremarkable appearance and her success in being trained to ignore passers-by whilst working or, when not working, to stand or sit unobtrusively at the experimenters side or to curl up under a seat and not to seek attention.

The experimenter acted as participant observer. For five days the dog accompanied her as she went about her daily routines of taking children to school, travelling to University by public transport, attending lectures etc. (the Dog condition). The same routines were followed without the dog, also for five days (the No Dog condition). The two conditions were randomly distributed across the total of the ten days of the experiment.

Prior to the start of the experiment, preliminary work was conducted to ensure that the experimenter could reliably use four categories to code the length of social encounters and the coding of participants as male or female and as friends, acquaintances and strangers. This was achieved through the experimenter being accompanied by a colleague for two days of her normal daily routine. Experimenter and colleague independently assessed social encounters and codings were found to have very high consensus.

The measures of social interactions in both Dog condition and No Dog condition were:

- number of interactions
- length of interactions
- gender of participant
- whether the participant was a friend, and acquaintance or a stranger.

The length of social encounters was coded as a brief non-verbal acknowledgement (a smile, nod, wave etc.), talk for up to one minute; talk for up to 3 minutes and talk for longer than three minutes. For the categorisation of participants, friends were defined as people well-known to the experimenter and with whom she regularly spent time; acquaintances were people known slightly, perhaps only by sight or to exchange a brief acknowledgement; strangers were those people not encountered before the experiment.

Prior to the start of the experiment, preliminary work was conducted to ensure that the experimenter could reliably use the coding categories. This was achieved through the experimenter being accompanied by a colleague for two days of her normal daily routine. Experimenter and colleague independently assessed social encounters and codings were found to have very high consensus.

5.2.3 Results

In total 206 encounters were observed, 156 when the experimenter was accompanied by the dog, and 50 when she was not. In 123 of the encounters, the interactee was female, in 83 male. This is likely to be a result of the larger numbers of females present in the psychology and humanities block of the university, and there was no comparable data available on gender distribution of potential interactees.

Formal statistical analysis comprised log-linear modelling of the four-dimensional contingency table obtained by cross-tabulating the 206 encounters by condition (dog/no dog), gender, participant category (friend, acquaintance, stranger) and length of interaction.

The analysis confirmed the difference between the dog and no dog conditions in the overall frequency of interactions ($\chi^2(1)=57.3$, $p<0.001$). However, the presence of the dog was associated with relatively few additional encounters with friends, but many additional encounters with acquaintances and, more particularly, with strangers ($\chi^2(2)=30.8$, $p<0.001$). This is illustrated in Table 5.1 .

	Friend	Acquaintance	Stranger	Total
Dog	34	57	65	156
No Dog	26	21	3	50
Total	60	78	68	206

Table 5.1: Frequency of interactions by condition and participant category

Although there was a substantial increase in the numbers of encounters experienced when in the presence of the dog, there was no interaction between the presence of the dog and the length of the encounters ($\chi^2(3)=2.5$, n.s.), that is, the presence of the dog did not influence the length of interactions.

5.2.4 Discussion

The experiment clearly demonstrated that more social interactions took place when the experimenter was accompanied by the dog. In this respect, the findings of Messent were supported. Moreover, it would appear that the catalysis effect of the dog was achieved even though the dog had been schooled not to solicit attention.

However, length of interactions was not found to be influenced by the presence of the dog. In this respect the findings of Messent (1982) were not supported.

The study also shows for the first time that the extent to which the dog acts as a social catalyst depends on the nature of the relationship between the participants. The data quite clearly show that the effect is largest with strangers and smallest with friends. This finding fits an interpretation that the dog removed or permitted the circumvention of inhibitions against striking up casual conversations.

The number of interactions with acquaintances was also considerably enhanced when the dog was present. Whilst these had regularly exchanged brief or non-verbal acknowledgements with the experimenter, the presence of the dog appeared to encourage verbal exchanges.

It was also noted that, for a small subset of female acquaintances, the catalytic effect appeared to carry over to subsequent interactions when the dog was absent i.e. acquaintances speaking to the experimenter in the Dog Condition frequently approached her when encountering her in a No Dog condition. Often interactions of this type were prefaced by an enquiry about the whereabouts of the dog. However, the size of the sample was too small to be sure that this is a reliable effect, although the experimenter is subjectively aware that since the experiment a number of people categorised as acquaintances are now regularly spoken to when met. For these it does appear that the presence of the dog 'broke the ice' and paved the way for more social interactions long after the dog ceased to accompany her.

Although this study successfully demonstrates that interactions were initiated by passers-by rather than the dog or handler, and that some interactions led to longer term acquaintances and friendships, it has been commented on that both dog and handler in this study could be perceived as approachable. The dog was a small yellow Labrador type, whilst the handler (the author) is a small female who was usually neatly dressed. This obviously raises questions of whether the catalysis effect would operate for people and/or pets whom people may perceive as less approachable or 'respectable'. In short, does the robustness of the effect depend on the appearance of the dog and/or handler?

5.3 Testing the robustness of the social catalysis effect (study 5)

A second study was conducted to investigate the robustness of the social catalytic effect of dogs. The main aim was to examine whether the appearance of the dog and/or handler influenced the amount of social interactions experienced.

5.3.1 Method

The handler was a white male undergraduate student, in his mid thirties, of average height and build. Once again, a trained guide dog, not in harness, was used to ensure that no interactions were due to the dog soliciting attention. However, for this experiment, a large black Labrador was used to reduce any perceived 'prettiness' of the dog.

The appearance of both the dog and the handler was manipulated to achieve the effect of a smart person with a pet dog and a roughly dressed person with a more aggressive looking dog. In one Dog Condition the handler was dressed in a smart but casual manner in sports jacket, collar and tie and neatly pressed trousers with the dog wearing a coloured matching collar and lead. In the other Dog Condition, the handler was dressed in torn, dirty jeans, scuffed work boots, old tee-shirt and a stained donkey jacket, whilst the dog wore a studded leather collar with a piece of frayed rope as a lead. There were corresponding No Dog conditions in which the handler appeared in the two forms of dress but without the dog. In two additional conditions the handler and dog appeared as if incongruently attired i.e. a scruffy person with a smart pet dog, and a smart person with the dog in a studded collar and rope lead.

Data were collected in four locations in Coventry city centre, where it would not be unusual to see a person with a dog but which would not be regarded as a dog walking

area, such as a park, where it is likely to meet numerous dog walkers. Eight trials, each lasting for 30 minutes, were conducted for each of the following conditions.

- Experimenter alone, smart dress.
- Experimenter alone, scruffy dress.
- Experimenter, smart with pet dog.
- Experimenter, scruffy with 'tough' dog.
- Experimenter scruffy with pet dog.
- Experimenter smart with 'tough' dog.

All trials were held at comparable times on Saturdays for each location. The procedure was for the experimenter to stand for 30 minutes at an appointed place (one of four previously selected locations) as if waiting. The number of people who interacted with the experimenter was recorded for each trial in each condition. Interactions were categorised as non-verbal (smiles, nods etc.) or verbal. The length of the interactions was recorded by the experimenter using a concealed stop-watch. These were categorised as up to 30 seconds; 30 seconds - 1 minute; 1-3 minutes; over 3 minutes. A second person, placed at a discreet distance from the experimenter, attended a selection of trials to monitor consistency and accuracy of recording. The 48 trials form the units of analysis in the ANOVAs.

5.3.2 Results

A total of 1170 interactions was recorded over the 48 trials. The breakdown by condition is shown in Table 5.2. A three-way Analysis of Variance on the total number of social interactions, with dog conditions, and person conditions as factors and location as a covariate, showed a main effect of dog conditions ($F(2,39)=57.609$, $p<0.0005$). Post hoc tests revealed this to be attributable to significant differences between the no dog condition and both of the dog conditions (Tukey's HSD test,

$p<0.001$). There was a main effect of person condition ($F(1,39)=13.251, p=0.001$) with the handler in smart dress achieving more interactions (mean 29) per 30 minute trial than when in scruffy dress (mean 19) per 30 minute trial. A main effect of location ($F(3,39)=6.112, p=0.002$) was due to one location, the busiest, attracting more interactions (mean 34) than the other three (mean 21). The statistical interaction between dog conditions and person conditions was marginally significant ($F(2,39)=3.108, p=0.056$) and as table 5.2 clearly shows, there was only a small effect of person appearance in conditions when the dog was absent.

	No dog	Pet dog	Tough dog	Total
Scruffy person	27	214	224	465
Smart person	30	325	350	705
Total	57	539	574	1170

Table 5.2: Total frequency of interactions by condition and appearance of dog and handler. Each cell represents eight 30 minute trials.

Although more interactions were observed when the handler was smartly dressed than when he was scruffily dressed, this effect was overshadowed when compared to the effect of having a dog present. When smartly dressed, interactions increased by over 1000% when accompanied by a pet dog, and over 1100% when with a 'tough' dog. When the handler was scruffily dressed, interactions increased by 790% when with a pet dog, and by 830% when with a tough dog. This is illustrated by the graphs in figure 5.1.

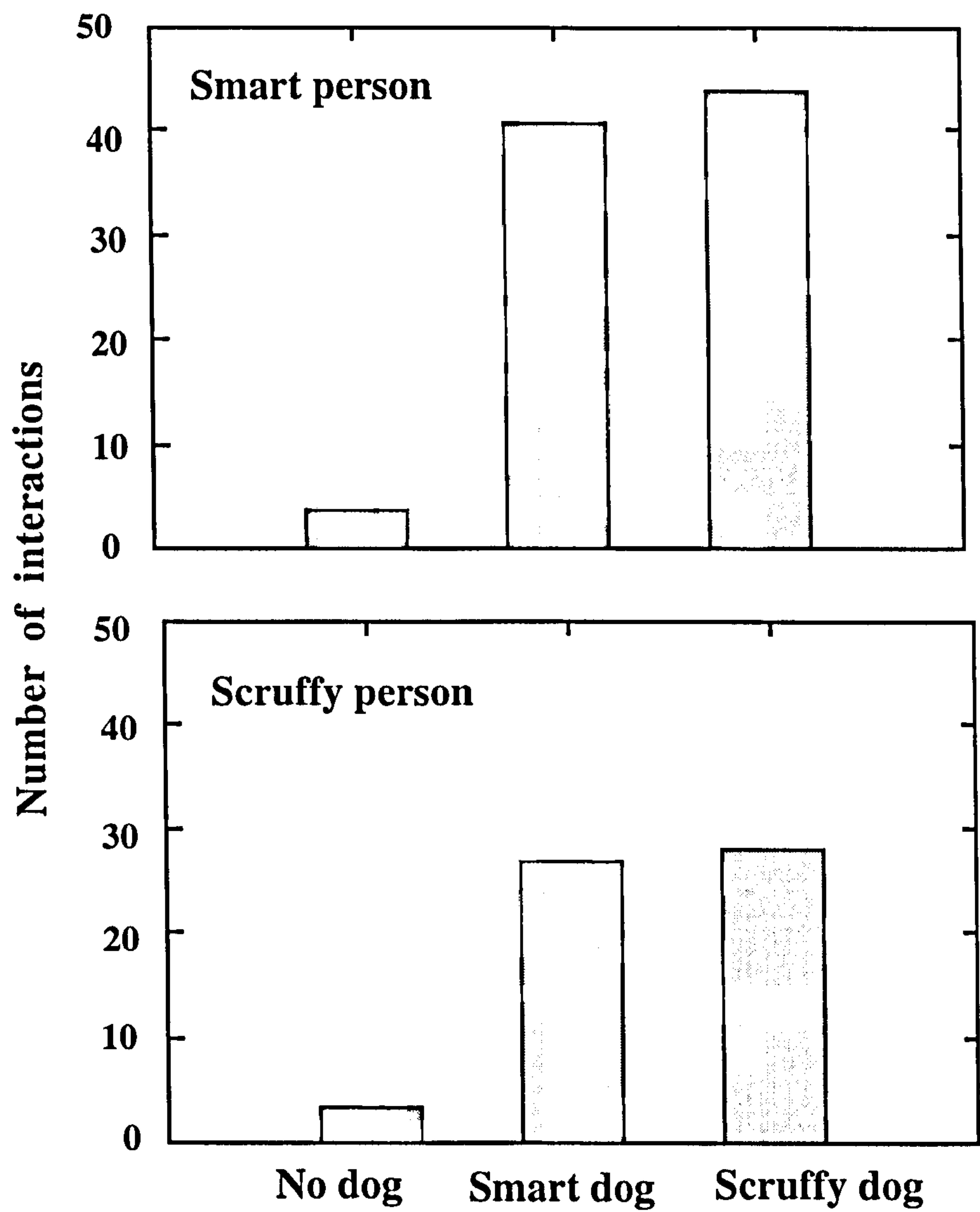


Figure 5.1: Mean number of interactions per 30 minutes by condition.

Somewhat surprisingly, more interactions were attracted when the dog appeared as a 'tough' dog, wearing a studded collar and frayed rope lead than when she wore a coloured colour with matching lead. The handler had been instructed to note the number of positive and negative interactions (since a dog made to look fierce or unpredictable may provoke adverse comment) but he reported no negative comments regarding the dog or her appearance.

There was a significant effect of dog conditions on the length of interactions with passers-by ($F(3,126)=81.193, p<0.05$). Pairwise comparisons showed a significant

difference between the no dog condition and both dog present conditions but only for brief exchanges such as verbal greetings or short/passing comments of up to thirty seconds (Tukey's HSD tests $p < 0.005$). No effect was observed for longer durations of exchanges.

5.3.3 Discussion

The results indicate that the catalytic effect of having a dog present persisted even when the appearance of the dog and/or experimenter was less appealing. There was only a trivial difference between the two person conditions where the dog was absent. Conditions where the dog was present elicited a very large increase in both non-verbal and verbal interactions. Surprisingly, the appearance of the dog i.e. as a pet or a 'tough' dog did not detract from this effect. In contrast, the appearance of the experimenter did have an effect on the number of interactions.

The findings would appear to support the assertion by Lockwood that people are more likely to be ascribed positive qualities when in the presence of an animal, and, indeed, the findings could be interpreted as the dog mitigating the perhaps less desirable appearance of the handler in his scruffily dressed condition. However, this interpretation may be doubtful. Other studies (e.g. Rossbach & Wilson, 1993) have failed to replicate the findings of Lockwood's original work, as has a parallel study, designed by the author but carried out by two undergraduate students, which attempted to investigate whether people really did ascribe more positive qualities to people accompanied by a dog. This study is briefly described since it was designed to complement the work reported in Study 5.

In this study photographs were taken of a young male either dressed smartly or scruffily, similar to Study 5, and of a young woman who was also dressed smartly (neat, tailored suit and makeup) or scruffily (Army combat jacket over calf length

cheesecloth skirt, Doc Marten boots, dark 'gothic style' make-up and unkempt hair). Photographs were also taken of each of the models accompanied with the same dog, in the same, attire, as in Study 5. In addition there were two photographs of the dog alone, one as a 'pet dog' and one as a 'tough' dog, again as in Study 5.

Subjects were asked to view a selection of the photographs and to rate the person in the photograph on their approachability, honesty and helpfulness. Subjects were divided into groups so that each group saw each model in only one mode of dress. Subjects also saw only one photograph of the dog alone, either as a pet dog or a tough dog, and were asked to rate the dog on its friendliness, suitability as a pet and trustworthiness in temperament.

As would be expected, subjects rated the dog-alone slides more positively when the dog appeared as a pet dog than as a rough dog in a studded collar and frayed rope lead. The pet dog was consistently rated as having a better temperament, more obedient and more suitable to be a pet. Ratings of the models in each mode of dress, but without dog, did not produce such clear-cut findings. Subjects rated the smartly dressed female model significantly more favourably than when she was untidily dressed, but there were no such significant differences for the male model for whom dress did not significantly affect subjects' ratings. When subjects viewed the models in the company of a dog the results indicated that the presence of a dog in a photograph did not significantly influence subjects' perceptions of the person. The ratings were not more favourable for those models appearing with a dog. In fact, the female model was most positively rated when smartly dressed and without a dog. The most marked finding was a strong gender influence, with the male model being rated as less approachable than the female.

These results do not support the Lockwood hypothesis that animals enhance the appearance and/ or the perception of positive qualities ascribed to a person with an

animal. Moreover, the results make the results from Study 5 all the more remarkable that the catalysis effect remained so strong, since the models used in the photographs were deliberately dressed so as to reflect the style of dress of the dog handler in Study 5. It would appear that even though people may not ascribe more positive qualities to people with animals, they nonetheless may be motivated to interact with them. This may be explainable through the nature of the presented images. Photographic images are, of course, static whilst real people afford acknowledgement or greeting in ways that photographs do not.

Despite the apparent lack of support for the Lockwood hypothesis, it does seem as though the catalytic effect of a dog is not only real but very robust, although more work is required to identify the underlying reasons for its strength since it seems most likely that it is not explainable by the kind of process suggested by Lockwood.

5.4 Summary of studies 4 and 5 on a dog as a social catalyst

The two studies were designed to further examine the claims made by Messent (1982) that dogs could act as powerful social catalysts. The combined outcomes of the two studies may be summarised as follows

1. Dogs may act as powerful social catalysts even when trained to ignore passers-by or potential interactees. Thus the effect is initiated by the interactees and not the dog or handler.
2. The effect is not confined to areas commonly associated with the activity of dog-walking. It is therefore improbable that the effect is solely attributable to a perception of mutually identified activity, as when two dog walkers meet in a park or recreation area.

3. The outward appearance of a dog does not appear to detract greatly from its ability to act as a social catalyst, as demonstrated by same dog appearing as a pet dog and as a 'tough' dog in studded collar. However, in both the conditions the dog was calm and well-behaved. It is unlikely that a poorly behaved dog, or one that was exhibiting signs of aggression would have the same effect.

4. The outward appearance of a person does not seem to greatly detract from the ability of a dog to facilitate interactions with that person. Whether smartly dressed and scruffily dressed, the handler experienced a very large increase in interactions when accompanied by a dog.

5. The greatest increases in interactions were found to be amongst strangers (from study 4) and for brief, casual interactions (study 5), suggesting that people are motivated by the presence of a dog to exchange greetings and brief comments, but not to participate in longer exchanges.

6. The observed tendency for acquaintances from study 4 to engage the experimenter in conversation on occasions when the dog was absent (but subsequent to an earlier interaction when the dog was present) suggests that even when regular meetings with the same people do not in themselves encourage interactions, the presence of a dog can act as a catalyst in an initial interaction, this effect continuing to exert its influence at later encounters whether or not the dog continues to be present. In essence, this could be termed as an 'ice breaker', paving the way for later, maybe anticipated, encounters.

The two studies demonstrate the robustness of the social catalyst effect of dogs, and how numerous casual encounters may be elicited from unknown, or relatively unknown people. Whilst this may in itself help foster a sense of integration as it involves frequent, if brief, interaction with people, it is a largely artificial portrayal of

many of the encounters known by dog owners to occur. Study 4 more accurately illustrates the circumstances in which many dog owners find themselves i.e. meeting the same people on a regular basis, as when walking their dogs. Intuitively, this may lead to greetings, exchange of comments or information about their pets or themselves, and even an anticipated meeting at a future occasion. The question of whether these encounters may elicit sufficient human contact to bring about discernible health benefits, or whether they can lead to more than casual interactions and progress to the level at which people met through pets become part of a social network requires more detailed investigation into the content and functions of network members and an examination of how they were met. This is examined in the next chapter.

Chapter 6: Pet ownership and enhancements to social networks (study 6).

This study represents the first phase of a much larger, ongoing investigation into the nature and functions of people's social networks. Funded by the ESRC under the ROPA grant scheme, the study aims to examine whether pet owners demonstrate enhanced social networks through the opportunities for social interaction provided by their pets. The study involved personal interviews with cat owners, dog owners and non-owners to investigate physical and psychological health in relation to size and composition of their social networks. Although almost all studies conducted on social catalysis have focused on dog owners, cat owners were included in this study since, even though not taken for walks, there are anecdotal reports of cats providing opportunities for social interaction, such as people petting cats in passing, when buying cat food, talking of one's cat to a neighbour etc. Also, by incorporating cats into the study it is possible, if cats were found not to generate significant catalytic effects, to assess the relative impact that social interactions via a pet dog on social networking. For this reason it was necessary to impose recruitment criteria that dog owners should own only dogs, but no cats, and that cat owners should own only cats and no dogs. In practice, these criteria were not simple to apply and, although it was possible to recruit owners of dogs without cats and cat owners without dogs, it was necessary to allow the ownership of other species such as fish or small caged animals in order to recruit sufficient subjects.

6.1 Method

6.1.1 Subject recruitment

Fifty-two dog owners, 44 cat owners and 43 non-owners were recruited to the study by means of three methods. In the first instance, a researcher employed under the

ESRC grant, took a display board and leaflets to a large pet superstore and invited shoppers to participate in a study investigating relationships, including person-pet relationships and health. People displaying interest were told that the university was conducting a study into social relationships may influence health and well-being. Further details of the study were not given at this stage. They were given a letter explaining that participation in the study would require a personal interview in their home which would last for approximately one to one and a half hours. The letter contained a tear-off slip that the participant could use to suggest a suitable time for the interview. The researcher then contacted them by telephone to finalise a date for interview. The same method of recruitment was also used in an immediately neighbouring DIY superstore to ensure that owners and non-owners were recruited from a broadly similar sample of people using that particular shopping site.

Subject recruitment was also conducted in the main foyer of the large Coventry City Library in the city centre. Once again, a display board was used to identify the study was examining health and relationships and was being carried out by the University of Warwick. Subjects from the cat owning sample, dog owning sample and non-owners were recruited in this way, being given the same information as those recruited from the pet superstore and the DIY store.

Finally, as the study did not recruit sufficient cat owners via these two methods, a poster was displayed in veterinary surgeries local to the university. The poster requested cat owners or dog owners to take part in the study. An envelope of letters, again with a tear-off strip, and a pre-paid envelope in which interested subjects could return their slips to the University was positioned by the poster. Subject recruitment was completed through this method.

6.1.2 Instruments

Each subject was interviewed in his/her own home. The interview comprised nine sections as follows

1. Background details - age, gender, present/last occupation and whether this involved shift work. This latter item was included since it is known as a factor contributing to physical and psychological symptoms of stress. For the purposes of analysis 6 age bands were used: 17-25 years (N=18); 26-35 years (N=25); 36-45 years (N=25); 46-55 years (N=31); 56-65 years (N=15); over 65 years (N=15).

2. Current health status - subjects were asked if they were receiving medical treatment for a range of physical illness from a pre-constructed list, or if they had any physical health problems not specified on the schedule. Those who indicated health problems were asked how long they had the problems. All subjects were asked to categorise their health as poor/ a few problems/fair/good/ excellent.

3. Life events checklist - subjects were asked to indicate whether they had experienced in the previous six months any particular life events from a pre-constructed list of 22 items including financial difficulties, being a victim of crime, death of a family member or close friend, arguments that left bad feeling, work problems, divorce or separation, and a number of positive items such as becoming better off financially, meeting a new partner etc. Subjects were also asked if they had experienced any other events not appearing on the schedule but which they felt to have had a positive or negative effect during the previous six months. Those subjects indicating that they had experienced such events were asked to rate the level of impact on their lives on a scale of 1 -5 where 1 = an extremely negative impact and 5 = an extremely positive impact, with the midpoint of 3 denoting no impact.

4. Social Network and relationship descriptors - this section comprised two parts. In the first part subjects were given a large A3 printed table on which to record members

of their social network. The table was divided into columns designed to capture the range and closeness of relationship types encountered in a number of social contexts..

The columns were labelled as follows:

1. People who live in the same household as you.
2. Your relatives who do not live in the same household as yourself.
 - (a) those you feel close to.
 - (b) others.
3. Close friends.
4. Colleagues at work (leave blank if not in employment).
 - (a) Colleagues you feel close to.
 - (b) Other colleagues.
5. Colleagues in voluntary work e.g. Charity work, School Governors, Local Council, Hospital visiting etc.
 - (a) Colleagues you feel close to.
 - (b) Other colleagues.
6. People you associate with in clubs, societies or informal gatherings e.g. sport, dances, bingo.
 - (a) Close associates.
 - (b) Other associates.
7. Casual acquaintances.
8. Other people not mentioned who are important to you.

As well as identifying the source of relationships and their closeness, the column headings were intended to help prompt the subjects into recalling and identifying members of their social network. Subjects were required to list the people they felt appropriate to each column heading. It was stated that subjects did not need to write the full names of the people they listed, but could use nicknames, initials or some other description meaningful to them.

In the second part of the Social network section, subjects were given a sheet containing 32 descriptors about relationships reflecting levels of liking, trust, conflict, regard, confiding etc. Example items are 'people who accept me the way I am', people I can trust with personal information, 'people I exchange small favours with', people I find it easy to laugh with.

Subjects were required to list the people they considered as fitting the relationship descriptor in the space provided on the sheet, taking the names/initials of the people they had previously entered on the network sheet. Should subjects think of someone whom they would wish to enter as a person meeting a description but had neglected to enter on the network sheet, they were permitted to then enter the name on the network sheet and then in the box on the descriptor sheet. In this way the descriptor sheet acted as second prompt for recalling members of their social network as well as the fulfilling its primary aim of identifying the nature and functions of the relationships.

5. The General Psychological Well-being Scale (Dupuy, 1984), a 32 item measure of general psychological health, was administered to all subjects

6. The Battle Self Esteem Scale (Battle, 1992) was administered to all subjects.

7. The UCLA Loneliness Scale (Russell, Peplau & Cutrona, 1980) was administered to all subjects

8. The symptom checklists as used in the study of student hardness (Study 3) to measure physical health psychological health (constructed and piloted for use in studies of examination stress and for bereaved populations running concurrently in the department) were administered to all subjects. In addition, data on smoking and drinking habits were collected.

9. Relationships initiated and/or maintained via a pet. Non-owners were not administered this section. Dog owners were asked to reflect on their social network list and identify any people on the list who they felt they met or continued to know because they owned their dog. Examples were given such as when walking their dogs, shopping for the dog food, attending clubs or shows. If the participant identified people on the list as meeting this criteria they were asked what sorts of things they and the identified people did together. Cat owners were also asked to reflect on their social network list and, since there are rather less obvious ways in which cat owners meet people, they were told that if they were dog owners the researcher would have asked if there was anyone there they felt they had got to know or kept in contact with because they had a dog, giving the examples from the dog owners section. This was to allow the cat owners to make their own judgement of what would be suitable or plausible equivalents for them. They were then asked if they could identify people who they felt they met or knew because they had a cat. If the participant identified people not on the list they were permitted to enter them on the network sheet in the column they thought appropriate if they wished to do so.

6.2 Results

Analyses were carried out to address two major issues a) to investigate whether pet ownership was associated with enhanced social networks, in terms of size, type of relationship and supportive functions of the relationships, and b) whether indices of psychological and/or physical health were more associated with the size/function of social networks or pet ownership.

Since the ability to own a pet may be influenced by the age or the health of subjects, preliminary analyses were conducted to investigate differences within the sample. Pet ownership status (cat owner/dog owner/non-owner) was not found to significantly

differ across the age groups or between the sexes of the subjects. Similarly, there was no evidence that the existence of chronic health conditions (heart disease, hypertension, diabetes, rheumatoid arthritis, epilepsy, kidney disease, asthma, mobility problems, tension and 'others') individually or collectively being linked to the prevalence of pet ownership amongst the sample.

6.2.1 Size of social networks

The total number of people identified in each of the subjects' social networks was examined using a three-way Analysis of Variance with age, pet ownership and health status as factors. There was a significant main effect of health status on the total size of social network ($F(1,135)= 4.4167, p=0.044$) with subjects experiencing a chronic condition reporting significantly fewer relationships (mean 38.09 relationships) than those subjects with no chronic health condition (mean 43.16). A near significant main effect of age group was found ($F(5,135)=2.248, p=0.054$), attributable to smaller social networks being reported by subjects in age group 1 (mean 31.56) and larger networks being reported by age group 4 (mean 47.52). There was no significant effects of pet ownership status on size of social network.

6.2.2 Distribution of social relationship categories

A four-way Analysis of Variance on the number of relationships in each of the 12 relationship categories was conducted with age group, sex, pet ownership group and health status as factors. Distribution of relationship types across the networks was found to be influenced only by age. This is illustrated in Table 6.1 .

	Age group						
Relationship category	17-25	26-35	36-45	46-55	56-65	ov 65	All
1 Household	2.06	1.44	1.97	1.90	1.13	.53	1.63
2a Relatives you feel close to	5.06	5.24	5.69	5.94	12.13	9.73	6.71
2b Other relatives	4.67	4.20	5.03	5.16	1.40	2.73	4.22
3 Close friends	6.17	8.76	7.54	9.19	6.73	8.40	7.96
4a Close colleagues at work	1.17	1.84	2.23	2.19	.47	.00	1.58
4b Other colleagues at work	2.89	4.00	2.97	3.90	.47	.33	2.80
5a Close colleagues volunt work	.17	.48	.51	1.29	.80	.67	.68
5b Other colleagues volunt work	.06	.44	.51	.71	.20	2.60	.68
6a Close associates	.83	1.48	.86	2.32	.33	4.27	1.60
6b Other associates	1.00	.76	2.43	1.68	1.33	3.07	1.73
7 Casual acquaintances	5.94	7.12	8.66	11.10	11.13	11.27	9.12
8 Other people important to you	1.56	2.52	2.14	2.13	2.27	1.93	2.12

Table 6.1: Mean number of relationships by age and relationship category.

Several differences that may be expected to occur through age were found. These were reductions in the number of people living in a household, as would occur when children leave home; and fewer relationships through workplaces in age groups where the majority of subjects had retired from employment. Older age groups also reported more relationships through membership of clubs and societies and through voluntary work. Pet ownership status was not found to associated with the number of relationships identified in any of the twelve relationship categories.

6.2.3 Functional aspects of social networks

Subjects were required to consider 32 statements concerning the functions and qualities of relationships and to identify who in their social network fulfilled such roles. Statements were designed to identify:

- a) relationships characterised by the provision of emotional and esteem support
- b) relationships characterised by the giving and/or receiving of affection and nurturance
- c) relationships characterised by negative affect and/or conflict
- d) relationships that enhanced a feeling of social integration

The number of relationships nominated by subjects for each statement within each of the above categorisations was totalled and proportioned for the number of statements contributing to the total score, giving each subject scores for emotional/esteem support, affection/nurturance, negative affect/conflict, and social integration derived from relationships.

A three-way Analysis of Variance was carried out on the totals of each of the four functions derived from relationships, with age, sex and pet ownership category as factors. Analysis of the scores for emotional/esteem support derived from human relationships showed no significant main effects of age, sex or pet ownership. In fact, pet ownership as a main effect explained least variance ($F(2,110)=0.161$, $p=0.833$). There was however, a significant pet ownership x sex interaction ($F(2,110)=1.29$, $p=0.045$) due to male dog owners reporting lower scores for emotional/esteem support than male cat owners, male non-owners or female dog owners. The nature of this interaction is shown in Figure 6.1 .

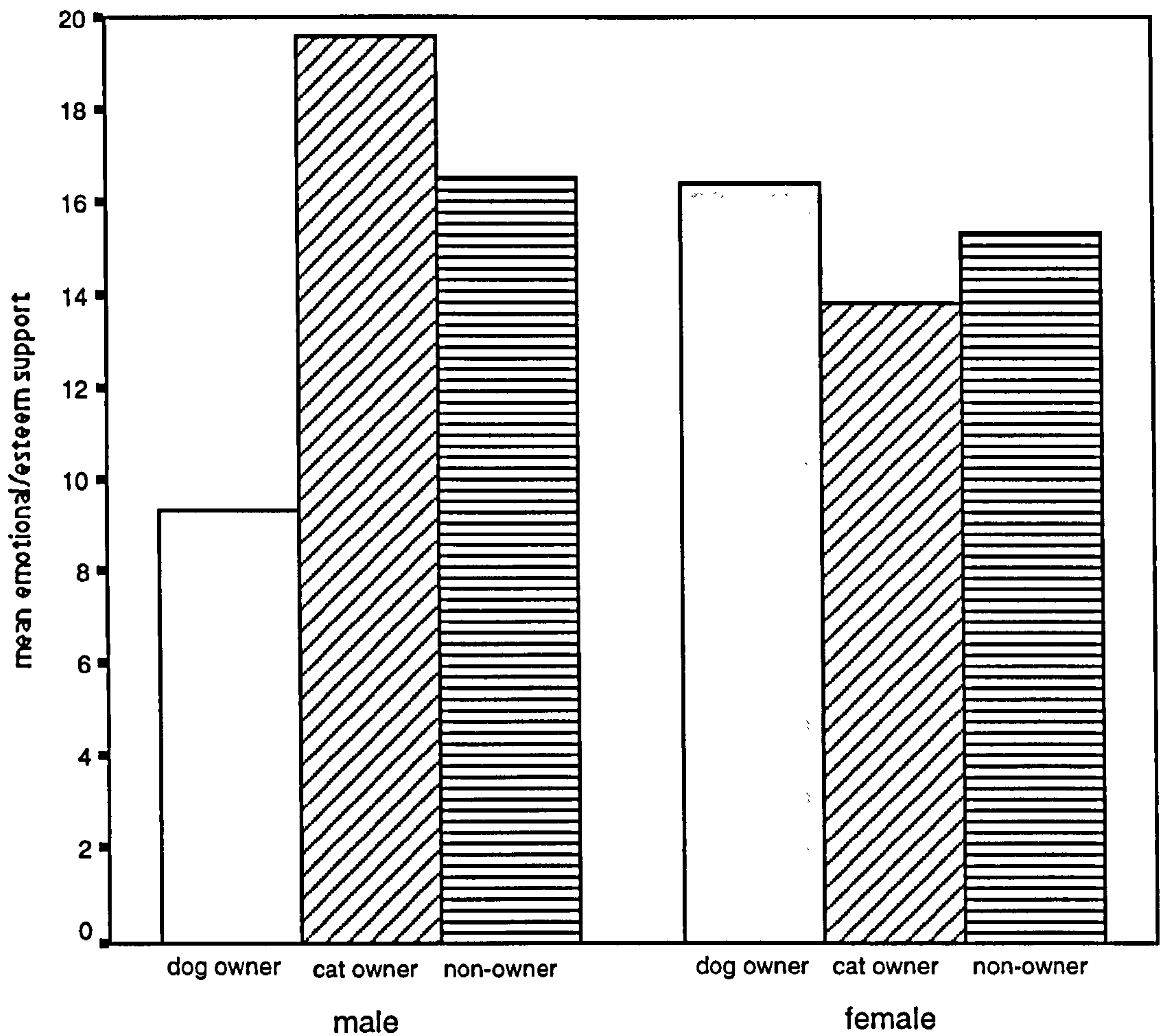


Figure 6.1: Mean scores for emotional/esteem support by group and sex.

As can be seen from figure 6.1, male dog owners had lower scores on emotional/esteem support than any of the other groups. However, none of the pairwise comparisons were significant (Tukey tests), possibly as a consequence of the relatively low numbers of males in the sample. There was a near significant comparison between male dog owners and female dog owners (Tukey's' HSD test, $p=0.058$).

Analysis of the scores for affection and nurturance which subjects perceived to be obtained from their social network showed a significant main effect of age group ($F(5, 113)=2.881, p=0.017$). As can be seen from Figure 6.2, the age effect reflects a fairly steady increase in affection/nurturance with age. No other main effects or

interactions were found in the analysis of perceived affection and nurturance. It is notable that once again pet ownership as a main effect explained least variance ($F(2,113)=0.346$), $p=0.709$.

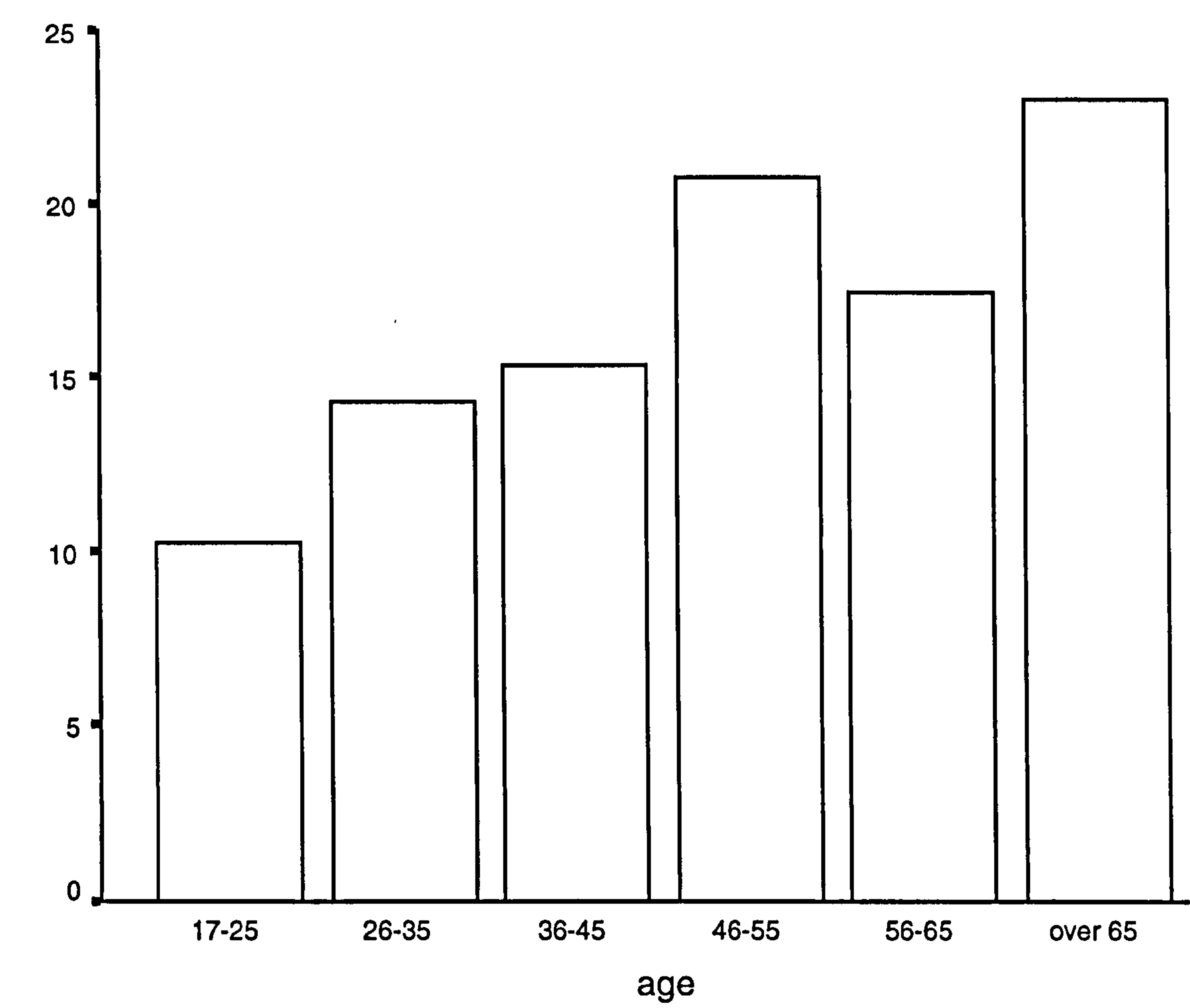


Figure 6.2: Mean Affect/nurturance scores by age.

Analysis of the scores for conflict and or negative effect arising from relationships within subjects' networks showed that there were no significant main effects or interactions, indicating that this variable was not affected by subjects' age, sex or pet ownership status.

Analysis of social integration scores revealed no significant main effects of age, sex or pet ownership category, but a significant pet ownership x sex interaction was found

($F(2,112)=3.29$) $p=0.041$). This appeared to be due to male dog owners reporting lower scores for social integration than any of the other groups (figure 6.3).

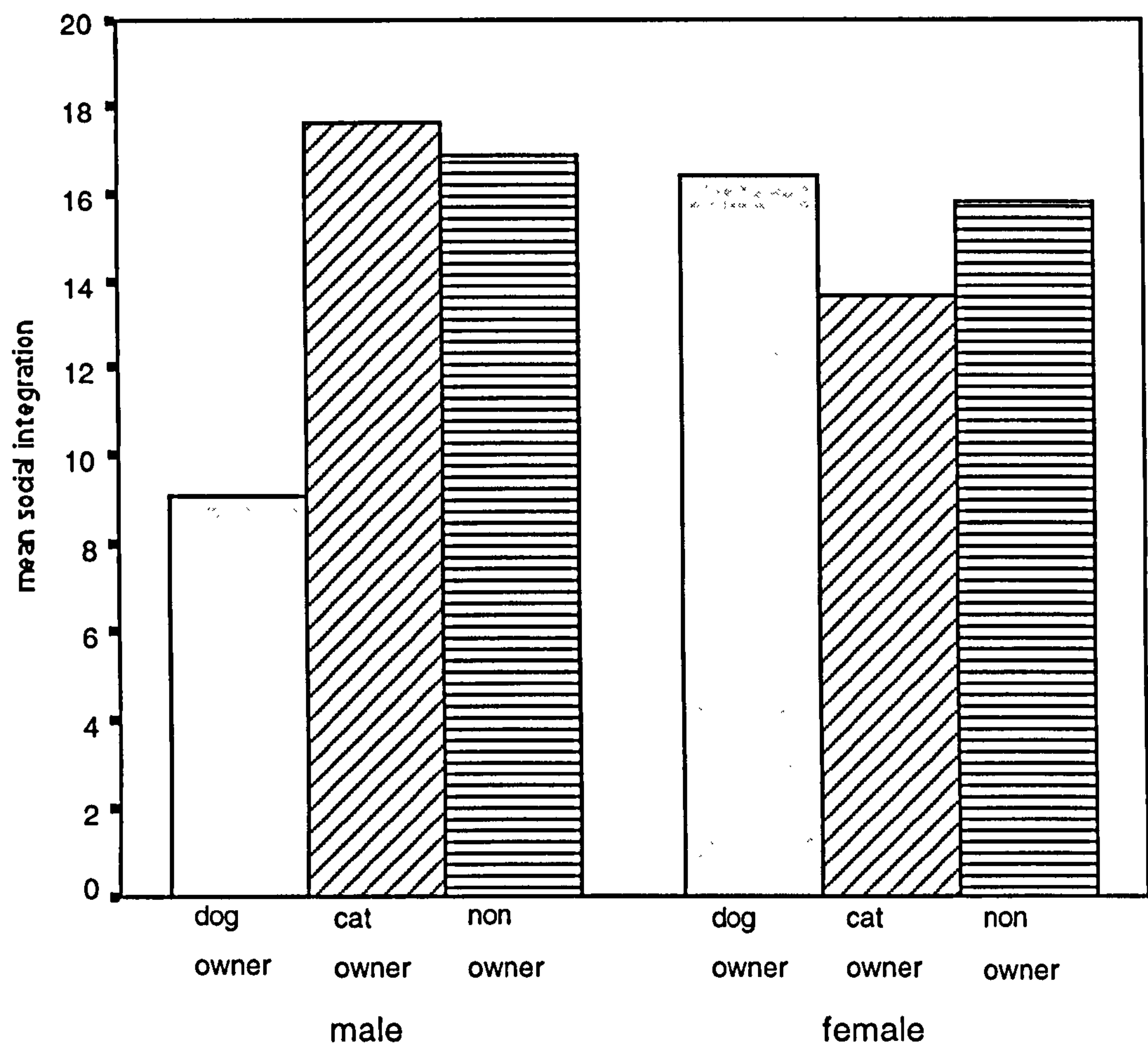


Figure 6.3. Mean scores for social integration by sex and pet ownership group.

As can be seen from figure 6.3, male dog owners had lower scores on social integration than any of the other groups. However, none on the pairwise comparisons were significant (Tukey tests), possibly as a consequence of the relatively low numbers of males in the sample.

Results from the analyses of the scores for social integration, affection/nurturance and emotional/esteem support showed similar patterns and trends. All of these three

variables had a significant or near significant main effect of age and a significant or near significant pet ownership x sex interaction, as summarised in table 6.2.

	main effect of age	sex x pet ownership interaction
Social integration	F(5,112)=2.10, p=0.071	F(2,112)=3.29, p=0.041
Emotional/esteem support	F(5,110)=2.09, p=0.072	F(2,110)=3.18, p=0.045
Affection/nurturance	F(5,113)=2.88, p=0.017	F(2,112)=1.97, p=0.145

Table 6.2: Summary of ANOVAs on support scores.

The three support variables were found to be significantly correlated with each other but not with conflict/negative affect scores (table 6.3).

	Negative affect	Social integration	Emot/esteem support	Affection/ nurturance
Negative affect	1.00			
Social integration	.25**	1.00		
Emotional/esteem support	.23**	.88**	1.00	
Affection/nurturance	.06	.84**	.81**	1.00

Table 6.3: Correlations among negative affect and support variables.

* $p \leq 0.05$; ** $p \leq .01$ (2-tailed)

On the basis of this high correlation between the scores for emotional/esteem support, affection and nurturance, and social integration it was decided to combine these to a single support score for subsequent analyses.

6.2.4 Effects of social support and pet ownership on psychological and physical health

Analyses were conducted to investigate whether the support received from a social network or pet ownership was related to health outcomes. Psychological and physical health was assessed by the use of the Psychological Symptom Checklist, the Physical Symptom Checklist, the Psychological General Well-being Scale (Dupuy, 1984), and the UCLA Loneliness Scale (Russell, Peplau & Cutrona, 1980) For each of these instruments, scores were totalled across items to give summary scores for each subject.

A three-way Analysis of Variance was carried out on the scores for each of these scales. Factors were health status (presence/absence of a chronic health condition), age, sex and pet ownership group. Support received from the network (aggregated from emotional/esteem support, affection and nurturance, and social integration scores) was included in the analysis as a covariate.

There were significant main effects of age ($F(5,132)=2.536$, $p=0.033$) with younger subjects in age group 1 reporting significantly more psychological symptoms (mean 76.09) than all other age groups. Psychological symptoms decreased with age, being lowest in age group 5 (mean 55.11) and age group 6 (60.69). There was also a significant main effect of pet ownership on psychological symptoms ($F(2,132)=3.366$, $p=0.039$). Cat owners reported fewest psychological symptoms (mean 61.32) as compared to dog owners (mean 66.41) and non-owners (69.02). No interactions between the factors were significant.

The prevalence of physical symptoms was not found to be associated with support received from the network, health status, age, sex or pet ownership. Subjects with

chronic health conditions did report more physical symptoms (mean 59.68) than subjects without chronic health conditions (mean 54.35), and pet owners reported fewer symptoms (mean 56.33 for dog owners, 53.03 for cat owners as compared to 60.15 for non-owners). However, these were not significant. A significant two-way interaction between health and age ($F(5,132)=2.388, p=0.043$) was attributable by more physical symptoms being reported by the subjects in the youngest age group who had a chronic health condition.

General psychological well-being, as measured by the Dupuy General Psychological Well-being Scale, was related to support ($F(1,132) = 8.738, p=0.004$) and health status only ($F(1,132)=14.049, p<0.0005$), with subjects who had a chronic health condition reporting lower scores for general psychological well-being (mean 69.77) than did subjects without such conditions (mean 79.28).

Self-esteem, frequently cited as an outcome of both satisfactory social relationships and pet ownership, was measured by use of the Battle Self Esteem Scale (Battle, 1992). It was found that self-esteem was positively related to support received from the social network ($F(1,132)=9.323, p=0.003$) but that pet ownership was not. Health status was also related to self-esteem, ($F(1,132)=6.397, p=0.013$) with subjects who had a chronic health condition reporting lower levels of self-esteem.

Subjects' assessment of loneliness as indicated by the ULCA Loneliness Scale was significantly related only to support ($F(1,132)=17.894, p<0.0005$). The nature of the relationship between loneliness and support is illustrated in Table 6.4 which also shows the correlations among the psychological and physical outcome variables, relationship support and negative affect, and the presence/absence of a chronic health problem.

	Psy sympt	Phys sympt	Well being	Loneli- ness	Self esteem	Relat Suppt	Negat affect	Health prob
Psychological symptoms	1.00							
Physical symptoms	.52**	1.00						
Psychological well-being	-.64**	-.54**	1.00					
Loneliness (UCLA)	-.51**	-.19*	.39**	1.00				
Self esteem (Battle)	-.63**	-.37**	.62**	.68**	1.00			
Relationship support	-.28**	-.12	.24**	.35**	.26**	1.00		
Relationship negat affect	.28**	.14	-.07	-.14	-.08	.22*	1.00	
Health prob (Y/N)	.12	.16	-.30**	-.02	-.25**	-.06	-.07	1.00

* p<0.05 ** p<0.01 (2-tailed probabilities)

Table 6.4: Pearson correlations among psychological and physical outcome variables, relationship support and negative affect , andthe presence/absence of a chronic health problem.

6.2.5 Impact of pets on social network

To investigate whether pet ownership may have contributed to the composition of subjects' social networks, pet owning subjects were asked to identify any people in their social networks who they considered they had met, or the relationship maintained, as a consequence of owing their pet.

The findings differed greatly between cat owners and dog owners. The mean proportion of dog owners' social networks deemed to be formed or maintained as a

consequence of owning their dog was 11.26%. However, the range was great. The majority of dog owners (58%) nominated no relationships, with 13% indicating that between 1 and 3 relationships were formed through their dog. Six percent of dog owners attributed much larger proportions, between 35% and 75% of their total networks reported as being met or maintained through owning dogs.

For cat owners the mean proportion of social networks considered to be attributable to owning a cat was 2.25%, with over 63% of cat owners reporting no relationships being formed or maintained as a consequence of cat ownership. The range differed from that observed in the dog owning sample. Fourteen percent of cat owning subjects nominated between 1 and 4 relationships formed or maintained through their cats, with a further 16% nominating between 5 and 9 relationships. As with the dog owners, 6% of cat owners nominated larger proportions, up to 12%, of their networks as being attributable to cat ownership, although these were considerably less than reported than some dog owners.

Although it would appear that for the majority of pet owners comparatively few relationships appeared to initiated to maintained as a result of owning pets, this could still exert an important influence on psychological well-being if such relationships were characterised by closeness and/or the provision of supportive functions.

Examination of *what type of relationships* were formed or maintained through pets was conducted through inspection of the relationship categories occupied by those persons nominated as being met through pets, and what functions they performed. A comparison was made with the remaining relationships not identified as being met or maintained through pets.

Relationship category	Number met through dog	not met through dog	Percent met through dog
1 Household	2	84	2.3%
2a Relatives you feel close to	0	372	0%
2b Other relatives	0	199	0%
3 Close friends	24	367	6.1%
4a Close colleagues at work	2	86	2.2%
4b Other colleagues at work	0	116	0%
5a Close colleagues volunt work	3	19	13.6%
5b Other colleagues volunt work	7	42	14.3%
6a Close associates	10	68	12.8%
6b Other associates	36	51	41.4%
7 Casual acquaintances	151	383	27.6%
8 Other people important to you	11	105	9.5%

Table 6.5: Relationships identified as being met/maintained through a dog.

Again a different pattern emerged between the dog owning group (table 6.5) and the cat owning group (table 6.6). The most frequent categories of relationship met through, or maintained by, pet ownership were friends and acquaintances.. In both cases, this was far more common with dog owners than with cat owners, as might be expected. However, for some owners, even cats appear to be a non-trivial source of friends. Dog owners also identified a not insignificant number of relationships with people met through clubs and societies as being a consequence of dog ownership. For many subjects it is likely that these were connected with dog training clubs.

Relationship category	Number met through cat	not met through cat	Percent met through cat
1 Household	0	70	0%
2a Relatives you feel close to	0	227	0%
2b Other relatives	0	188	0%
3 Close friends	6	342	1.7%
4a Close colleagues at work	3	76	3.4%
4b Other colleagues at work	0	174	0%
5a Close colleagues volunt work	0	53	0%
5b Other colleagues volunt work	0	19	0%
6a Close associates	4	60	6.2%
6b Other associates	1	70	1.4%
7 Casual acquaintances	17	368	4.4%
8 Other people important to you	6	99	1.2%

Table 6.6: Relationships identified as being met/maintained through a cat.

The support received from the relationships initiated or maintained through the pet was assessed through examination of the 32 descriptions of relationship functions. As can be seen from Table 6.7, cat owners reported fewer relationships regarded as pet initiated or pet maintained as providing any of the 32 relationship functions, indicating that for cat owners owning a pet does little to enhance social provisions.

Relationship function	% of total obtained from those met through dogs	% of total obtained from those met through cats
No need to pretend	12.4	1.6
Make time for	4.0	1.0
Enjoy doing things for	5.0	0.08
Hard to get on with	9.1	0.00
Can ask help from	10.1	1.6
Those I find likeable	10.2	1.3
Get on well with	9.1	1.5
Accept me as I am	12.4	1.7
Those who upset me	7.7	1.5
I can relax with	7.5	1.7
Think well of me	10.1	0.8
Make me feel good	11.5	1.9
Special to me	3.2	0.5
Rub the wrong way	9.4	0
I can laugh with	6.2	1.6
Exchange ideas/thoughts	8.2	3.6
People I trust	4.8	5.4
Never put me down	10.9	2
I keep my distance	0	1
Would notice my absence	9.3	2.6
Offer to help me	16.3	0.5
I can ask favours from	8.7	2
Seek if I feel low	7.4	0

Table 6.7: Relationships met/maintained through dog or cat by relationship functions *table continued on next page*

Distract me from worries	11.7	1.4
People who put me down	1.6	0
People I care about	6.5	0.9
People I feel I know well	6	1.2
Have lots in common	6.7	2.2
Those I can easily talk to	10.7	1.8
Confide problems in	5	2.2
I feel are good company	5.7	3.4
People who care for me	4.6	2.3

Table 6.7: *Table continued from previous page* Relationships met/maintained through dog or cat by relationship functions

As can be seen from Table 6.7, cat owners reported fewer relationships regarded as pet initiated or pet maintained as providing any of the 32 relationship functions, indicating that for cat owners owning a pet does little to enhance social provisions.

For dog owners, however, the findings suggest that a considerable number of relationships regarded as pet initiated or pet maintained do provide valuable relationship functions. Dog owners identified ten functions for which over 10% of the relationships providing them were seen as being pet initiated or pet maintained. All ten functions were of a positive nature and indicate something of the characteristics of the relationships providing them. Relationships that offer help in small ways had the highest percentage of dog initiated maintained relationships, followed by those where the subject felt accepted for what they were and did not have to put on a pretence. This sense of unconditional acceptance or easy relationship is also mirrored in the high percentage nominated as probably thinking well of a subject even though a disagreement had occurred, and that subjects felt that these relationships would never

try to 'put them down'. Liking, talking, asking for help and being a distraction from minor problems also figured highly in the functions provided by these relationships.

Although these functions are of a positive nature, other characteristics of the subjects' nomination suggest that pet initiated/maintained relationships may not be regarded as especially close relationships. Functions most widely believed to be characteristic of close relationships, such as confiding problems, trust, feeling cared for, a sense of 'specialness' and knowing well, were amongst those achieving the lowest percentage of relationships seen as coming from pet initiated/maintained relationships. Thus, for dog owners, it would appear that the provisions from relationships they regard as being made or maintained through their dog are of a positive but not necessarily close nature. This intuitively fits the notion of people being met through regular dog walking, but suggests the formation of a additional casual network rather than the enhancing of a network where supportive functions may be strengthened.

6.3 Discussion

The results of study 6 indicate that pet ownership does not have a significant effect on the size of subjects' social networks nor on the composition regarding the types of relationships that make up the networks. This is contrary to the common assumption that pets, and especially dogs, may serve to help owners meet people. Although it has been established that dogs can, and do, exert a powerful influence as social catalysts it would appear that such encounters are casual interactions and not sufficient to impact on social networks. Thus the proposition that interactions initiated as a consequence of pet ownership may lead to enhanced social networks, at least with regard to size or composition, is not supported by the data.

It could be argued benefits from relationships need not be dependent on the size of a network, that just a small number of relationships are required to significantly

enhance network quality providing these relationships provide supportive functions. However, analyses suggests that pet ownership does not lead to any discernible benefits with regard to provision of emotional/esteem support, affectionate or nurturant relationships, or enhancement of social integration. Nor does it appear that pet ownership affects the levels of conflict or negative affect arising from relationships. In spite of this, dog owners, in particular, reported that a number of relationships which they regarded as being pet initiated or maintained did indeed provide functions that could be regarded as positive, such people they talk with, or like, or feel they have no need to put up a pretence with. However, it would appear that may well be of a casual, perhaps superficial nature, which, although pleasurable, may not have any real effect on network provisions.

Pet ownership is frequently cited as beneficial in elevating self-esteem and alleviating loneliness. However, neither of these variables were found to be significantly associated with ownership of either cats or dogs in this study, with pet owners exhibiting similar scores to those of non-owners. Enhanced psychological well-being, also frequently reported as a benefit arising from pet ownership, was not apparent in this sample.

Pet ownership, therefore, would not appear to afford any benefits to social networks either in terms of enhancing quantity or quality over and above that experienced by non-owners. Thus the hypothesis that pets may act as social catalysts and that this may lead to the formation of relationships that may serve functions to enhance health is not supported.

So what of the association of pet ownership and health? This study did not find evidence that pet ownership was significantly associated with better physical health. However, it was found that pet ownership was significantly associated with better psychological health. Cat owners, in particular, reported fewer psychological

symptoms than either dog owners or non-owners. Dog owners also reported fewer psychological symptoms than non-owners although this was not significant. Thus pet ownership does appear to exert some beneficial effects on health at the psychological level that cannot be accounted for via enhanced social networks. This conclusion is strengthened by the evidence that the greatest benefits seem to be accrued by cat owners for whom the impact of pet ownership on social networks is negligible.

In conclusion, the studies described in this section suggest that the catalysis effect generated by dogs is indeed extremely robust but that this may not lead to the claims earlier studies have made as arising from increased social interactions. For example, there is no evidence that this leads to an alleviation of loneliness, increased self-esteem or increased social integration. This may well differ for special populations such as people with physical disabilities, but was not found in this sample drawn from the general population.

Whilst benefits to psychological health were associated with pet ownership, the data suggests that these were not attributable to differential characteristics of social networks amongst pet owners and non-owners. It is therefore concluded that an explanation for the observed health benefits cannot be adequately provided by the indirect causal association class of explanation on the basis of these studies alone. A further study is currently being conducted which extends the two reported here. The study investigates whether there are differences in health status and/or enhancements to social networks between two groups of dog owners; those that engage in some form of dog related activity such as membership of obedience clubs, breed clubs or agility clubs, and dog owners who do not engage in such activities, merely keeping their dog as a pet, and a control group of non pet-owners. The hypothesis underlying the study is that dog ownership itself may not afford particular health benefits or enhancements to social networks, but for owners who are motivated to join organisations related to dog ownership the enhancements to their networks may be

associated with significant health benefits. A group of non-owners who engage in hobbies or recreational pursuits serves as a control to examine whether ownership of a pet, participation in pet related hobbies, or non-pet related hobbies confers any advantages to social networks and/or health. Preliminary analysis of the three groups suggests that participation in any hobbies, pet-related or otherwise, is associated with enhanced networks but no special health advantages are apparent between dog owners and non-owners. Dog ownership without club affiliation affords some degree of social catalysis but appears not to provide the opportunities for development of these contacts into social relationships. Those relationships derived from recreational pursuits, pet-related and non pet-related, appear to provide companionate functions that afford pleasurable relaxation but not to fulfil supportive functions associated with close relationships. It may be that these relationships provide leisure and recreation as an escape from daily stresses and foster psychological resistance to stress rather than provide support at times of need (McNicholas & Collis, 1998, in press)

Returning to the results of Study 6, in which some evidence of health advantages for pet owners was observed, if it is not feasible to explain these in terms of enhanced human contact or social provisions that may be a consequence of pet ownership, then it may be necessary to look for a more direct effect of pet ownership on health. This is considered in the next section.

SECTION 4

DIRECT CAUSAL ASSOCIATION

Chapter 7: Relationship focused explanations of direct causal association

This section of the thesis examines a third class of explanation for an association between pet ownership and health; that pets may exert a direct influence in ways that may lead to enhancements to psychological and/or physical health.

Two possible mechanisms are explored. The first concentrates on the nature and functions of the **relationship** between pet and owner and examines how such a relationship may afford health-promoting outcomes. The second mechanism originates in the work of Friedmann and it does not rely on any form of relationship between pet and person but examines the evidence for a direct influence being exerted on the human **physiology** when in the presence of pet animals.

Both have been regarded as direct influences in previous studies although they have remained poorly understood and have been frequently described as if they share common roots. This has perhaps been due to the assumption that if the presence of a pet animal can produce measurable reductions in such physiological factors as blood pressure and heart rate for people who do not own the particular animal used in the trials (as in the Friedman studies), then the effects must be greater for people who own pets (and especially for those who may be 'attached' to their pet or see their pet as a valuable relationship) since inevitably they will be in the presence of an animal for substantial periods. There has been no empirical evidence to support this. Indeed, as yet, there has been no empirical evidence to support the assertion that any reductions in physiological responses achieved in laboratory trials mirror situations occurring in 'real life' nor that they are of sufficient magnitude to significantly impact on health.

The primary aim of this section is to attempt to separate out the possible mechanisms for a direct causal association between pet ownership and health from these two

strands of research. A distinction is made between *relationship focused* and *non-relationship focused* mechanisms. It is essential to draw this distinction clearly since as yet there is no evidence to justify their combination, and it is highly plausible that separate mechanisms may be in operation for each. That is not to say that they be totally without overlap, rather that the best way to understand any relationship between the two is examine them separately until there is sufficient evidence to justify their combination.

7.1 Relationship focused mechanisms

Although there has been considerable research into the person-pet relationship it should be emphasised that the mechanisms examined here do not represent a return to attachment theory. As argued earlier, attachment theory has been largely misused and misinterpreted and it offers little to advance explanations of causal associations between pet ownership and health. Rather than attempt to classify the person-pet relationship within a typology of relationships, it is more fruitful to examine the relationship in terms of the functions and roles it serves. Attachment is a distinct type of relationship, its critical feature being that of the provision of felt security, and it forms only a very small subset of relationships in a person's social network. However, attachment relationships may also provide many functions that are not confined to such a small subset, such as provisions of social support which can be derived from non-attachment relationships such as friendships which fall under the heading of 'affectional bonds'. Indeed, some forms of valued support need not even be confined to friendships but can be provided through professional or even casual relationships. This departure from attachment theory is, marked by a switch in focus from the question 'what is the person-pet relationship' to 'what does it do'.

This switch is important since in looking at the functions served or provided by the person-pet relationship the emphasis is no longer on it's 'specialness' or particular

characteristics which sets it apart from other relationships which, although not supported by empirical evidence, has often been implicitly claimed. Focusing on the functions derived from the person-pet relationship puts it within the wider context of relationships in general. Perhaps this is as it should be. Person-pet relationships rarely exist in isolation in the normal population and it has been a rather notable flaw in companion animal research to largely ignore the existence of other relationships and the provisions that may be derived from them. The majority of people, pet owners or otherwise, generally have an array of relationships that both provide functions and command some measure of obligation to maintain the relationship. In examining the functions of the person-pet relationship, it is perhaps more pertinent to pose the question of where that relationship fits into social networks and whether it can provide similar functions.

Chapters 5 and 6 discussed the importance of human social relationships to health and examined whether pet ownership could indirectly lead to positive health outcomes by facilitating human contact and thus providing access to the benefits potentially available from human relationships. This section of the thesis also focuses on the provision of social support but examines the role of the *pet* as a provider of supportive functions that mirror some of the elements of human support known to have a positive influence to health. Referring back to House et al's (1988) distinction between structural and functional levels of relationships, the focus is primarily on the functional content of the relationship between person and pet, what it provides and the function it serves. Viewing the person pet relationship through this framework enables access to a very considerable body of research attesting to the influence of social relationships on health outcomes, not adequately addressed in previous research in the field of companion animal studies. The emphasis is on research on the provision of social support from relationships.

7.2 Human relationships, social support and health

As discussed in chapter 5, research into the value of supportive relationships to physical and psychological health has experienced huge growth in the last two decades since the work of Cobb (1976). It is now well-established that the support provided from social relationships can exert a powerful beneficial effect on both physical and psychological well-being. Numerous review articles and meta-analyses (Sarason, Sarason & Garung, 1997; Schwarzer & Leppin, (1992) attest to the importance of social relationships and the functions they serve in the adjustment to major stresses such as bereavement (Littlewood, 1992); recovery from illness (Glass, 1993); coping with the physical and psychological effects of surgery (Kulik & Mahler, 1989), and the maintenance of psychological well-being and freedom from anxiety (DeMakis & McAdams, 1994).

In what remains perhaps the most highly influential paper in the area, Cohen & Wills (1985) outlined the mechanisms underlying the beneficial effects of social support. They put forward two possible mechanisms whereby social support derived from relationships may reduce the severity of responses to a stressful event and the associated risks to health and well-being. This is schematically illustrated in Figure 7.1 .

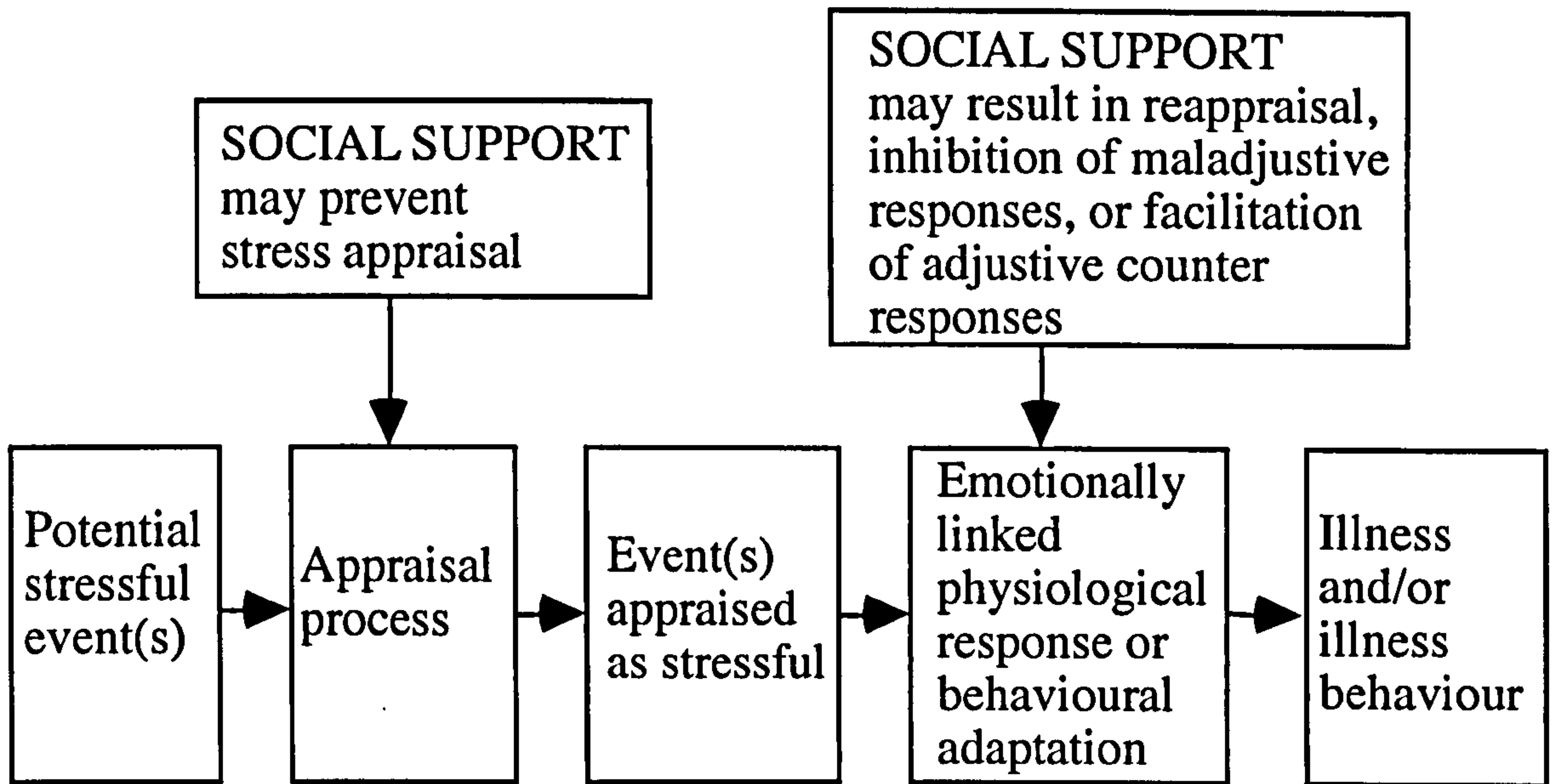


Figure 7.1: The points at which social support may interfere with the hypothesised causal link between stressful events and illness (from Cohen & Wills, 1985).

The first of these mechanisms lies in the perception of the availability of an existing supportive network. Knowledge that help and support of the types defined by Cobb (1976) can be mobilised in the need arises is believed to exert an influence on the perception of the severity of a stressor. A stressor for which help or solution is immediately recognised as available is unlikely to produce responses severe or prolonged enough to impact on health. This mechanism is referred to as the main effect hypothesis where social support, just by the knowledge of its existence, reduces stress responses to some events. The second mechanism, and perhaps the most widely endorsed, is that of the buffering hypothesis. This hypothesis proposes that the supportive functions provided from social relationships (emotional support, esteem support; instrumental support and informational support) intervene after the perception of an event as stressful and exert their effect by reducing the severity and chronicity of the stress responses, thus avoiding or moderating risks to health.

Some researchers have further explored the nature of the types of support provided by relationships. Cutrona and Russell (1990) proposed that support provided should match the need demanded by the nature of the stressor. For example, an event that is

perceived to threaten self-esteem should be 'matched' by support of the type that reaffirms worth and competence. Although not universally endorsed, this notion of matching does appear to have some foundation, especially where stressors are long term and the demands for coping change overtime. Littlewood (1992) suggests that the adjustment to bereavement is assisted in the earlier stages by emotional support when the impact of bereavement is primarily emotional shock and numbness, and the need to express emotional distress. Later in the process, a need for support of a practical and informational nature is called for as the bereaved person adjusts to the need to construct a new way of life.

This pattern of a need for emotional support in initial stages of a stressor is repeated across a number of situations, such as adjustment to loss of functionality (Glass, Matchar, Belyea & Feussner, 1993), diagnosis of a life threatening illness such as cancer (Wortman, 1984) or coronary heart disease (Berkman & Syme, 1979). It would appear that the provision of emotional support is central to the successful coping with a number of major and lesser stressful events, so the question of who and what sort of relationships can provide this as a potential buffer to stress responses becomes vital. Furthermore, is emotional support solely derived from human relationships?

7.3 Pets as providers of supportive functions

Somewhat ironically, in view of the criticism of the use of attachment theory in companion animal research, the investigation into whether pets can provide social support shares the same starting point as many of the studies into attachment, i.e. the pet as a 'significant' relationship in an owners life. Indeed, many of the attachment studies and attachment scales are useful, not because of what they offer in terms of illustrating attachment, but for what they reveal about the nature and functions of the relationship. For example, many highlight aspects of the relationship such as

regarding the pet as a family member or a friend, talking to a pet about troubles, the belief that a pet knows when its owners is upset and offers comfort (Lago, Kafer, Delaney & Connell, 1988). Other scales contain similar items, often including functions of confiding in a pet (Holcombe, Williams & Richards, 1985), the belief that the pet knows how their owner feels (Stallones, Marx, Garrity & Johnson, 1988), and liking for a pet's proximity (Poresky, 1989). Although these items do not denote attachment to a pet in the way that the authors claim, they do provide valuable insight into what goes on in a person-pet relationship. If these items measure commonly occurring features of a person-pet relationship, pets may well provide some functions that bear considerable similarity to the social support derived from human relationships.

The notion of support from pets is not new. Indeed the work based on Friedmann's studies and on attachment theories have both pointed out that social support may be derived from pets. However, the concept has only been fleetingly mentioned and never fully applied. Rather it has been used as a vague reference to indicate a general 'feel good' factor derived from the relationship, disregarding its potential explanatory power even at a time when research into the influence of supportive relationships on health was at its peak.

Somewhat incongruously, some studies have even cited now classic research (such as the role of supportive relationships on recovery from myocardial infarct, Berkman & Symes, 1979) but used them as a basis for applying attachment theory to person-pet relationships. In retrospect this may be understandable, if erroneous, at a time when social support research was just developing but the mistake has persisted and replicated itself in later studies which continue to allude to social support but turn from examining the functions of relationships in favour of pursuing the notion of an attachment relationship.

Even today, social support, as referred to in companion animal studies, falls far short of applying the now enormous body of literature on the association between supportive relationships and health. Indeed, unless quickly corrected, there may well be the danger that the use of social support in companion-animal studies may be as much misused as the concept of attachment. This has, at least in part, due to the trend in companion animal studies to regard social support as a generalised function or benefit, contrasting sharply with the majority of social support research that has focused on the benefits of support at times of need, such as when ill, upset or under stress. With this focus has been possible to identify health related outcomes from the presence and function of supportive relationships, and it is in this arena that the value of social support has been most strongly identified. However, in spite of claims that pets relieve stress, this area of research has been largely ignored as relevant to companion animal studies. This is unfortunate since it could be construed as an unwillingness for researchers to take due notice of important research developments that do not specifically refer to person-pet relationships. It is argued that person-pet relationships should be viewed as just one part of a constellation of relationships in a person's social network that may provide support at times of need. The substantial body of research into relationship functions cannot be dismissed as peripheral simply because one partner to a relationship may be an animal.

The empirical work presented in this section attempts to place the person-pet relationship within the wider context of people's social networks and lifestyles. It seeks to explore whether the person-pet relationship can be regarded as being a supportive relationship and, if so, what sorts of support it provides in comparison to other relationships and under what circumstances it may be mobilised.

Three studies are presented. Each focuses on a population for which claims have been made that pets may have particular benefit since it would be in these populations that the role and functions of pets may be most detectable.

Study 7 examines the role and function of pets in children's social networks, and illustrates the development of a methodology which may be of particular use in identifying when and how pets may provide supportive functions *along with other human relationships*. A particular emphasis is made on the use of the array of relationships for different functions under different circumstances to identify which relationships are perceived as supportive under which circumstances.

Study 8 also makes comparisons between the functions of human and pet relationships, but here focuses on a population for whom human social relationships are abnormal - young people with autism.

Finally, study 9 examines the effects of assistance dogs to people with disabilities and for whom the main objective of obtaining a dog is not pet ownership but an enhancement to mobility and independence. The study focuses on the functions of the relationship between dog and owner and its influence on self-perceived health.

Chapter 8: The role of pets in children's social networks (study 7)

The aim of this study was to devise and validate a methodology which would permit the examination of the role of pets in children's social networks and to enable a comparison of children's perceptions of the support that is available to them across the range of their relationships, both human and pet.

8.1 Introduction

Pets are frequently thought as affording special benefits and enjoyment to children. Accordingly pet ownership is most frequent in families with children (Rhem, 1993). Reported benefits to children believed to derive from pet ownership include the learning of responsibility for care, empathy for another living thing, and education in matters of illness, death and reproduction (Bryant, 1990; Davis & Juhasz, 1995). Pets are also widely believed to provide a special form of companionship for children, this being the most frequently stated reason for acquiring a pet for children (Endenburg, 1995).

Research into children and their pets appears to have divided itself into two broad approaches: research investigating the characteristics of the child-pet relationship (e.g. Bryant 1990; Endenburg 1995); and research comparing child pet owners with child non-owners and their social development in such social skills as empathy and support seeking (Saloman). Neither approach has investigated the role of the pet in a child's wider social network, comparing it with the roles and functions served by other (human) relationships. It is argued that this is an important omission. If the nature and function of the child-pet relationship is to be understood - especially if it is to be claimed that it affords particular benefits - then it needs to be investigated as

part of the child's wider network of social relationships together with the uses and perceptions the child has of his/her other relationships.

8.1.1 Children's social relationships

Early research into children's social relationships centred on attachment theory and the role played by the relationship between a child and his/her primary caregiver (Bowlby, 1969; Ainsworth, 1979). This relationship was regarded as providing a 'template' for subsequent relationships. Additional bodies of research began to build up typologies of child relationships, such as friendships, sibling relationships, parental relationships etc. However, more recent consideration of this area has been given to the similarities between relationships. Dunn (1993) has called for research into children's social relationships to look 'beyond attachment' and to focus on the range of differing relationships that a child may experience and to identify similarities and differences in quality and functions served by these. Dunn argues that many characteristics of relationships are common to a range of relationships. For example, mutual warmth, expressed affect, conflict, shared activity, comfort seeking and so on may feature not only in parent-child relationships but also in child-sibling relationships, child-friend relationships and many others. Consequently in examining children's relationships it becomes necessary to take a broader view on a child's perspective of his/her relationships and the functions perceived to be available from them.

Social support from relationships illustrates the view taken by Dunn that many characteristics and functions of relationships may be present in a variety of relationships. Unfortunately the body of research that focuses on children's support networks (e.g. Belle, 1989) tends to be rather separate from the literature on specific types of relationships. As with most areas of research involving children, it is most important to select appropriate methodologies to assess their perceptions of

relationships. Observation of children by trained researchers (e.g. Brody, Stoneman & MacKinnon, 1982) has been used but has limited value since it only lends itself to brief observation periods and interactions between only a few individuals present in the observation area. Similarly, parental reports (e.g. Lewis, Feiring & Brooks-Gunn, 1987) may not accurately reflect the child's own perceptions of the relationships in their network. For these reasons, a number of studies have sought to develop methodologies which enable children themselves to report their perceptions of their relationships with others.

A key study by Furman & Burhmester (1985) developed a self-report questionnaire for children aged 11-13 years which assessed both perceived availability and quality of support over the dimensions of affection, intimacy, reliable alliance, enhancement of worth, companionship and instrumental help. They also examined relative power and conflict within relationships and the importance of the relationship. Children were asked to rate their mother, father, grandparent(s), siblings, best friends and teacher for the availability and quality of support. Mothers and fathers received the highest ratings for provision of affection, intimacy, enhancement of worth, sense of reliable alliance and instrumental support. Grandparents rated second as providers of affection and enhancement of worth, whilst teachers received their highest ratings for the provision of instrumental help. Friends were rated highest for companionship and sibling relationships as highest for conflict. The results are perhaps unsurprising but they provide evidence that children can reliably distinguish between the characteristics and functions of their various relationships.

For younger children, the use of self-report questionnaires has obvious limitations. The required reading age, concentration span and understanding of the task preclude this method for the majority of children under ten years. In recognition of this, Reid, Landesman, Treder & Jacquard (1989) suggested that research on assessing support networks in younger children should have particular characteristics. Questionnaires

were not recommended. Instead instruments should be devised that are interesting and enjoyable, interactive, make use of visual materials, be personalised or personally relevant, be commensurate with the child's cognitive and emotional understanding, and that there should be scope for investigating both family and non-family relationships.

Reid et al devised a methodology based on their recommendations. Called "My Family and Friends", it was developed for use with children between 6 and 12 years old. Children were asked to list their family members, relatives, friends and their teacher, the names of these being written on individual cards. The children were then asked to rank these in answer to verbal questions directed to assess the instrumental, emotional, and companionship support they provide. A card barometer with a moveable indicator was then manipulated by the children to indicate the level of satisfaction the children perceived from the relationships to these forms of support.

This methodology was found to be acceptable and understood by even the younger subjects. It had acceptable test-retest reliability and demonstrated that children were able to identify support availability from the relationships in their identified networks and to give assessments on the satisfaction received. Reid et al distinguished between 'specialist' and 'generalist' support providers. A generalist is a person who was viewed by the child as providing a range of support functions over a number of situations, such as mothers and fathers, whilst a specialist was a person who was regarded as being a provider of a particular type or types of support. For example, teachers were ranked highly as satisfactory providers of informational support but not for emotional support or companionship. Friends were rated highly in their provision of companionship but not for informational support. Again, the results are not surprising but confirm that even young children can and do distinguish between relationships in terms of the support they provide.

8.1.2 Children's relationship with pets

The research described above has concentrated on a limited range of children's human relationships as identified by the researchers. None have permitted the child to select his/her relationships nor they have considered the potential role of pets in children's social networks. However, recent suggests that children may regard pets as important relationships. Blue (1986) described the relationship between child and pet as frequently characterised by love and affection, feelings of comfort, nurturance and a sense of responsibility. She also pointed to the value of a pet in promoting the learning of non-verbal communication, empathy, and the sequence of life, death and grief. Bryant (1985) investigated social support networks in children between 7 and 10 years by taking them on a 'neighbourhood walk' designed to incorporate familiar kinaesthetic cues into the interview schedule and improve reliability. She found that children spontaneously generated the names of their pets, or neighbours pets, as members of their social networks and described them as special friends or confidants. The identification of these two functions had high test-retest reliability with correlations of 0.99 and 0.92 respectively. In a later paper, although not further exploring the comparative support functions of pets and other human relationships, Bryant (1990) examined the nature and benefits that may accrue to the child from his/her relationship with a pet. She identified four main factors: mutuality, a form of close companionship; enduring affection; self-enhancing affection, probably through elevated self-esteem; and exclusivity.

A logical progression from these two areas of research - children's support networks and children's relationship with pets - is to investigate whether pets figure significantly in children's social networks, and what, if any, supportive functions they serve. Although the methodology devised by Reid et al (1989) has been shown to be understood by children and that children were able to use the barometer-like scale to indicate a level of satisfaction with support from their listed relationships, it is not

clear if this method could be used to obtain from children reliable comparisons or rankings from children between relationships . A new methodology was therefore devised that would be interesting and enjoyable for child subjects and which would enable them to make their own judgements of relationships preferred for particular support provisions across a range of situations where support might be needed. The study reported here describes the development of a methodology to examine the social networks - human and pet - and support perceived as available from members of these networks, in a population of children aged 6 and 7 years.

8.2 Method

Subjects were a class of 22 children aged between 7 and 8 years (Year 3) attending a middle school in Kenilworth, Warwickshire. Thirteen subjects were boys and 9 subjects were girls. Eighteen children owned pets, four did not.

The basic testing procedure involved two stages which were carried out on two consecutive days. The whole two-stage procedure was repeated one week later to assess reliability.

The first stage of the procedure was to obtain a view of each child's social network as they, the individual child, perceived it. This was conducted with the class as a whole. The children were asked to think about their friends and their families, including any pets they may own, their teachers and other people who may be important to them, such as childminders or family members who did not reside in their household. The experimenter showed the children a poster of her 'important people', an A3 sheet of card on which were photographs of her partner, friends, family, pets, and 'teacher' (a colleague from the university), with their names written below each picture. In all there were 23 relationships depicted on the experimenter's list. The children were then asked to make a similar list of all their important relationships, writing down the

names of each person or pet on a sheet of paper. It was emphasised that each child's list need not contain the same relationships as the experimenter's list, nor did they need to be the same as other children's in the class. Rather, each child was asked to make his/her own list of the people/pets that were very important to them. No number was specified as to the size of the list, and help was offered to children who wished to list a person but were unable to spell their name or relationship. For example, 'Adelaide, my grandmother'

When each child had completed his/her list, the experimenter asked each child to look at their lists and to choose their 'Top Ten' of their most special relationships. The concept of a 'Top Ten' was chosen as children are very familiar with its meaning and importance since music, video games, cinema films etc. are all listed in this format so children were aware of what was required of them. The experimenter then showed her list of relationships again, together with her 'Top Ten' drawn from the total. These were her partner, some family members, friends and a dog. The children were asked to select ten from their lists of important relationships. Again, emphasis was made that the children's lists did not have to be the same as either the experimenter's nor their classmates. Pet owners were told that they did not have to include a pet if they did not really feel it was special enough to be amongst their Top Ten.

When each child had completed his/her list of Top Ten relationships they were presented with a selection of photographs of adults, older people, children and pets cut from mail order catalogues and magazines. The children were asked to choose one picture for each of their people on their lists. When each child had selected his/her photographs, these were pasted on to card and the name of the person/pet represented was written at the base of each figure.

This comprised the first stage of the procedure and was conducted in the course of one day at the school.

The second stage of the procedure took place the following day. Each child was interviewed separately in a room near to the classroom. The child was asked to bring his/her ten photographs and spend about 20 minutes talking to the experimenter. All children were happy to do so.

The children were asked to place the photographs representing their ten selected relationships on a table and to tell the experimenter who they were, by name and by relationship. For example 'This is Gavin, he's my little brother'. The experimenter then erected a cardboard 'room', similar to that found in doll's houses, for the figures to be placed in to represent them being at home.

The experimenter then told the child that she would tell the children a number of short stories. These stories were designed to elicit the child's responses to a need for support and to identify those relationships perceived by the child as best providing the type of support required. The stories examined needs for comfort, companionship or to feel better about themselves (esteem support). An additional story investigated the presence of conflict in relationships.

Eight short stories were told. Each was accompanied by a storyboard, comprising pictures and words, which helped the child focus on the main character and the type of need he/she required. These stories can be summarised as follows

1. Comfort when ill

The subject was shown a story board depicting a small boy in bed. The subject was told that the boy was poorly and could not go out to play and would have to stay in bed until he was better. As he was feeling a bit fed up and miserable, he would like someone to come to see him and help cheer him up a bit.

The subject was then asked 'If that was you, and felt like he (the boy in the story) felt, who would you most want to come and see you?' The subject then had to choose one of his/her photographs to represent who he/she would most want to come to see them if they were ill in bed. When the subject selected his/her first choice, the experimenter then removed the photograph and said, " But what if X (selected character's name) wasn't there, who would you choose? The subject then selected their next choice. The procedure was repeated until five characters had been selected and were recorded by the experimenter as ranks one to five in the subject's choices. The characters were then returned to the subject in readiness for the next story.

2. Comfort when scared

The second story also examined the need for comfort, this time in the context of having to cope with a potentially frightening event. The subject was shown a story board and told of a small boy who had to walk home from school through a long dark lane. The boy thought it was very creepy and would have liked someone to be with him to stop him feeling scared. The subject was again asked "If that was you, and you had to go down a long dark lane, who would you most want to be with you?" The subject then had to select his/her first choice of person in their Top Ten to accompany them to stop them feeling scared. This first choice was then removed and the experimenter asked ' If X wasn't there, who would be the next best?' This continued until five choices had been made from the available ten.

3. Confiding a problem

This story depicted a small boy who was being bullied by children he did not know. It was making him very miserable and presenting quite a problem to him. He knows that he has to tell someone who can help him. The subject was asked to imagine that they

were in that situation, and who they thought would be most helpful to tell of their problem. The subject selected their first choices and then the subsequent four choices in the same manner as before.

4. Confiding a special secret

The second story investigating confiding examined the telling/sharing of a special secret. The subject was told a story of a young girl who found a magic door at the bottom of her garden. The door led into a wonderful magic garden. The girl wishes she had someone to share in the excitement. A friendly wizard suddenly appears and welcomes her, but also warns her that she may only share her secret with one person. If she told any more than other person, she would never find her way back into the magic garden. The subject was then asked who they would share the secret with, if they were ever in that position, and their five choices were recorded.

5. Self esteem

Two stories regarding self-esteem were told. The first investigated the need to repair self-esteem when events had occurred that made could make a child feel badly about his/herself. The second examined the bolstering of self-esteem in readiness for an event that required self-confidence.

The first story told of a girl who is normally very sensible and organised, but who had a 'bad day' and when lots of things went wrong. She was late for school, forgot her pencil case so that the teacher was annoyed, forgot her lunch, lost things and then falls over on the way home from school and ruins her best shoes. Everyone says 'Oh, you silly girl!' all day long and she feels very bad about herself because this is so unlike her normal behaviour. She needs someone who knows she is not really silly and who would be able to reassure her that it was just one of those days. The subject

was then asked who would be most likely to be able to make them feel that they were not silly really. The subject's five choices were recorded.

The second story concerned a girl who had been selected to take a big part in a school play. It was a difficult part and she had to practice lots of songs, her words and actions. She makes lots of mistakes while she is practising at school and at home. This makes her feel silly and embarrassed. She knows she needs to practise to make sure she is ready for the play, but she only wants to practise in front of people who won't make her feel silly or embarrassed if she does make mistakes. The subject was asked who they would choose as being best to practise in front of, if they had to do what the girl in story does, and their five choices were recorded.

6. Conflict

A miniature plastic dustbin was placed in front of the subject. He/she was told that although people/pets can be special, we all get annoyed with them at times. When someone is especially annoying we can put them in the bin! The subject was asked, 'Who annoys you so much that you would put them in the bin first?' The subject made his/her first selection. They were then asked 'Who would be next in the bin because they annoyed you almost as much?' This continued for three rankings. This exercise was limited to three choices only since many children indicated that only a minority of their relationships warranted being put in the bin for annoying them.

A second exercise was carried out to examine the subject's perception of who they thought found they themselves (the subject) annoying. Subjects were asked 'Who do you think finds you annoying? Who would be the first to want to put you in the bin?' The subject selected the character they thought would be most likely to put them in the bin for being annoying. Again, the process was repeated for the selection of three characters.

The subjects were then told that this was the last story and were thanked for taking part. The whole procedure, except for the construction of the first network list, was repeated one week later to test the reliability of the subjects' responses. On re-test subjects were told that the exercise should not be regarded as a memory test and that they should choose their Top Ten relationships from their larger lists as honestly as they could, even if this meant they differed from their first selection.

8.3 Results

8.3.1 Test-retest consistency of subjects' selection of Top Ten lists

Kappa coefficients were calculated for the two Top Ten lists compiled by each child on test-retest sessions to assess consistency of selection. This was necessary in order to dispel possible doubts that children made their selections on preferences prevailing at the time of testing (e.g. choosing current 'favourites') and not on the criteria of selecting relationships that were of overall importance to them.

The mean number of relationships generated by the children for their larger first list of all the relationships considered important to them was 15, with a range between 9 and 23. Thus, there was scope for the majority of subjects to select a different Top Ten on the second occasion. This proved not to be the case. Four subjects had generated only nine relationships for their larger list, so this nine appeared on their Top Ten list. Kappa coefficients for the two Top Ten lists generated by the remaining 18 subjects are illustrated in Table 8.1

Subject	Kappa	Subject	Kappa
1	1.00	13	1.00
2	1.00	14	0.79
3	1.00	15	1.00
4	1.00	16	1.00
6	1.00	17	0.82
7	1.00	18	1.00
8	0.57	19	0.73
11	1.00	21	1.00
12	0.57	22	0.30

Table 8.1: Kappa coefficients showing consistency of children's selection of top ten relationships.

Kappa coefficients of 1.00 indicate an identical selection in first and second compilation of Top Ten lists. It can be seen that a large number of subjects made such selections, with only six subjects showing any disagreement between lists. Of these only subjects 8,12, and 22 showed substantial changes in selection (i.e. more than three relationships differing between the two lists).

8.3.2 Inclusion of pets in the Top ten lists

Eighteen subjects owned pets and listed these on their larger overall list. Of these, only one subject did not transfer his pet (a guinea pig) to his Top Ten list. Nine subjects had either a cat or a dog on their Top Ten lists; four subjects had a 'small pet' (rabbit, hamster, guinea pig, fish, bird, gerbil or the like) on their list and four subjects transferred both a cat or dog and a small pet to their Top Ten lists. Not all pets were transferred to the Top Ten lists. Some subjects owning more than one pet included them on the overall list but selected only one for the Top Ten list. For example,

selecting a budgie out of a budgie and a hamster; a rabbit from a rabbit and a dog; and a dog from a dog and a guinea pig. This willingness to select pets as significant relationships supports Bryant's (1985) claims that children may regard pets as special friends and companions within a child's social network. The high Kappa coefficients obtained for the Top ten lists indicates the consistency that children display in selecting their pets as special relationships.

8.3.3 Correlations of character rankings between sessions and between stories

The ranks obtained for relationships nominated for each of the eight short stories in the initial test session were correlated with those obtained in the re-test session to examine consistency. Where a relationship appeared in the first five ranks in one test session but not in the other test session, that relationship was assigned a rank of 6 in the latter case, or, in the case of the conflict scenario, a rank of 4 since only ranks up to 3 were recorded for this scenario. The correlations on the diagonal of table 8.2 are the test-retest correlations for each story. The high level of these correlations indicate that children are relatively consistent in their choice of relationships when imagining themselves as the main character in each of the stories. With the exception of the story concerning rehearsing in front of people who would not make the subject feel silly if they made mistakes in their practice, the correlations between the two times of testing were consistently higher than those between different stories (off-diagonal correlations in the table). The rehearsal story may have been rather unreal for children of this age (6-7 years) or may have been interpreted as presenting a problem or having a bad day, thus explaining the slightly higher correlations between this story and the stories more directly concerned with seeking help with a problem or esteem repair when having had things go unusually wrong.

	First session									
	Comfort when ill	Comfort when scared	Self esteem (rehearsing)	Self esteem (bad day)	Confiding a secret	Confiding a problem	Conflict: (annoys you)	Conflict: (you annoy)		
Second session	Comfort when ill	0.49	0.22	0.25	0.41	0.24	0.29	-0.09	0.02	
	Comfort when scared	0.12	0.48	0.33	0.32	0.34	0.31	-0.14	0.18	
	Self esteem (rehearsing)	0.10	0.19	0.43	0.27	0.32	0.32	-0.06	0.14	
	Self esteem (bad day)	0.34	0.30	0.45	0.57	0.25	0.51	-0.21	0.18	
	Confiding a secret	0.27	0.29	0.27	0.21	0.54	0.18	-0.04	0.05	
	Confiding a problem	0.16	0.46	0.45	0.57	0.24	0.63	-0.141	0.250	
	Conflict: (annoys you)	-0.14	-0.05	-0.19	-0.24	-0.11	-0.12	0.66	0.25	
	Conflict: (you annoy)	0.15	0.21	0.11	0.24	0.08	0.25	0.30	0.81	

Table 8.2: Correlations between relationship rankings for stories across test and re-test sessions. The correlations on the diagonal of the table are test-retest correlations between the same story on two occasions. For comparison, the off-diagonal correlations refer to different stories on the two occasions.

Some stories achieved high correlations with other stories indicating a similar choice of people nominated for their perceived value in providing help or support. For example, feeling scared and having a problem, and having a bad day and having a problem. Intuitively this makes sense since children were selecting from their own limited choice of ten special relationships who could be expected to give a range of support functions in differing situations. However, many of the stories revealed that children hold quite firm, consistent views about the appropriateness of relationship functions to be obtained from different people. The most noticeable of these were the stories concerning conflict which had very low correlations with other stories but very high correlations between the two times the story was recounted. This indicated that the choice of relationships was consistent and that they differed from the relationships selected for the other stories. Similarly, there was a consistency between the choice of people selected for comfort when a child was ill or with whom to share a special secret which differed from the choices of relationships for other stories.

This indicates that children can and do make considered selections of the appropriateness of people within their social network to fulfil relationship functions in accordance with a need presented by situations, and that their selection of appropriate people is consistent.

8.3.4 Consistency of relationship choices across subjects in response to needs

Further analysis was conducted to examine whether children showed similar patterns of selection amongst their relationships for similar needs e.g. the consistency in choices across subjects, such as selection of a friend for sharing a secret, or a parent to help with a problem. Although the children had slightly differing selections of relationships in their Top Ten lists, many nominated relationships were similar. For example, all children nominated mother and father, siblings, best friends and at least one other family member such as an aunt or a grandparent.

To measure the degree of consistency in the way that the subjects ranked people in response to the stories, an intraclass correlation coefficient (ICC(2,K)) was used. In accordance with the terminology of Shrout and Fleiss (1979), subjects were considered as 'judges' and the relationships nominated as 'targets'. This approach was preferred over Kendall's coefficient of concordance since, although the data were ranks, not all subjects included the same relationship types in the Top Ten lists, and some subjects had more than one of a relationship type e.g. two relationships classed as 'friend'. The results are summarised in Table 8.3 .

Story	Time 1			Time 2		
	ICC	F(16,180)	P	ICC	F(16,180)	P
Ill Scared Rehearse Bad day Secret Problem Annoys you You annoy	0.56	2.20	0.0065	0.77	4.26	<0.0005
	0.76	4.07	< 0.0005	0.65	2.77	0.0005
	0.68	3.05	0.0002	0.40	1.64	0.0630
	0.84	6.22	<0.0005	0.77	4.20	<0.0005
	0.73	3.60	<0.0005	0.70	31	<0.0005
	0.90	9.26	<0.0005	0.84	5.96	<0.0005
	0.80	4.91	<0.0005	0.79	4.67	<0.0005
	0.88	8.00	<0.0005	0.83	5.66	<0.0005

Table 8.3: Consistency of subjects' choices of relationships in each story.

It would appear that children share similar appreciation both of the needs portrayed by the different stories and the appropriateness of particular relationships to elicit particular functions. Thus, children are not only able to discriminate which provisions are needed and in which circumstances, they also share an agreement of who/ which relationships fulfil those needs. The one story displaying disparity between choices is again that of the rehearsal/making mistakes story presented as an esteem need. Again,

this is likely to be attributable to the comparative difficulty children had in interpreting this story.

8.3.5 Differential selection of relationships appropriate to need

Analysis so far revealed that children show consistency in their choices of special relationships both in the selection of their Top Ten and in their ranking of the relationships for each story. The latter finding implies that the subjects as a whole shared an appreciation of the needs to be fulfilled and the type of relationships that can provide appropriate functions. The question arises of whether children select different relationships for different needs and whether these selections were stable across the two test times.

A repeated measures Analysis of Variance on the ranks was conducted with subject, test time (session 1 or 2), story (1-8) and relationship type as factors. This produced non-significant main effects for all factors indicating that no significant influence was being separately exerted by differences between subjects, the session in which they were tested, the stories or the types of people nominated. A significant interaction between story and relationship type ($F(112,3487)=5.31$, $p<0.005$) indicates a significant difference in the selection of relationships in response to the different stories. There was no such significant interaction with the factor of time of testing suggesting that such relationship selections, although differing for the stories, was relatively stable. Thus it can be concluded that children do select different relationships in response to the needs portrayed by different stories and that this discrimination is consistent.

Relationship	Story									
	Comfort when ill	Comfort when scared	Self esteem (rehearsing)	Self esteem (bad day)	Confiding a secret	Confiding a problem	Conflict: (annoys you)	Conflict: (you annoy)		
Aunt	4.22	5.18	4.95	4.77	4.91	5.14	5.41	5.25		
Best Friend	3.96	3.54	3.71	4.25	2.42	4.25	4.89	5.06		
Cat	2.10	5.50	4.40	4.60	4.80	5.60	4.50	5.57		
Cousin	3.90	5.00	4.50	4.80	4.40	4.90	4.96	5.57		
Dad	4.11	3.23	3.84	3.16	4.70	2.77	4.58	3.08		
Dog	3.75	3.25	4.40	4.85	3.55	4.75	5.44	5.30		
Friend	4.86	4.80	5.16	5.23	4.04	5.26	4.32	5.20		
Grandad	5.32	5.32	5.00	4.71	5.46	5.14	5.32	5.19		
Grandma	5.02	4.86	4.55	4.57	5.24	4.86	5.51	5.36		
Mum	3.27	3.68	3.160	2.34	4.11	2.32	4.87	3.82		
Brother (O)	4.00	3.70	4.80	4.30	4.60	4.60	3.79	2.55		
Sister (O)	5.56	5.00	5.19	5.69	5.06	5.34	2.52	4.40		
Small pet	5.60	5.65	4.21	5.44	5.31	5.75	4.80	5.15		
Teacher	5.65	5.35	4.35	5.15	5.70	3.70	4.19	5.44		
Uncle	5.22	5.22	5.22	5.50	5.78	5.11	5.57	5.57		
Brother (Y)	4.05	5.40	4.82	4.95	4.64	5.82	3.60	5.18		
Sister (Y)	5.00	5.50	5.10	5.80	4.46	5.60	1.20	3.43		

Table 8.4: Mean ranks for nominated relationship, by stories. Shaded cells indicate the five highest ranking relationships for each scenario. (O) denotes older sibling, (Y) denotes younger sibling

Since there was significant stability in relationship selections across the two test times, the mean ranks of the nominated relationships were combined across sessions. Table 8.4 shows the mean of the combined ranks for the relationships nominated in response to each of the eight stories. Mean ranks greater than 5 indicate that few, if any subjects, nominated that particular relationship as being one of their first five choices of people in response to a need as portrayed by a story. Conversely, mean ranks of less than 5 indicate a relationship frequently nominated as being in the first five choices.

The shaded cells in the table show the relationships achieving ranks higher than five for each story. Viewed by column they show which relationships were most frequently nominated by the subjects; viewed by row they show the frequency in which a relationship achieved a ranking within the first five for more than one story.

The pattern emerging from the children's selections lends considerable support to the effectiveness of the methodology employed since it is consistent with many intuitions which one might have about the ways children may perceive the uses and functions of human relationships in their networks. For example, younger siblings are ranked highly only in one or both of the stories concerning conflict, and seemingly not regarded as appropriate people from which to elicit help with a problem, comfort when ill or in a frightening situation or to bolster esteem. This is much as would be expected. Older siblings are also highly ranked for both of the conflict situations, being seen as both annoying to the subjects but also acknowledged that they (the subjects) are a source of annoyance to them. Older brothers are also seen as appropriate as sources of help in situations where a child may feel scared, perhaps as a function of them being an older person to accompany the child. Similarly, perhaps because of the nature of the problem described in the story in which a child was being bullied, older brothers were nominated as being of potential help. Older sisters were not regarded as appropriate for either of these stories.

Best friends were most likely to be the person with whom subjects would choose to share a special secret. Again, this is much as might be expected, as is the presence of best friends as high ranking in all but the conflict stories. Teachers figured only as a potential helpers with a problem such as bullying and as sources of annoyance to subjects. Also anticipated was the range of support functions perceived as available from parents. Mothers were consistently ranked in the top five for all stories except that of being annoying to subjects. Fathers were less likely to be nominated as appropriate for providing comfort when ill, or sharing a special secret, but as more appropriate for providing help when the child was scared, needed a boost to self-esteem or had a problem.

Some relationships nominated as being part of the Top Ten list were not nominated as being in the first five rankings for any of the stories. These tended to be relationships that were not immediate family, such as uncles, aunts, and grandparents. In contrast, some relationships featured amongst many stories. This was especially so in the case of mothers, fathers and best friends and indicates a closeness of relationship that fulfils many needs across many situations. This reflects what Reid et al referred to as generalist providers of support provisions. Relationships fulfilling a narrower range of supports, or regarded as appropriate for only certain situation are termed 'specialist' providers. Examples of specialist providers in this sample are teachers, as helpers with a bullying problem, and friends (not best friends) with whom a subject may share a secret.

Rankings given to pets suggests that children can realistically discriminate between functions that pets can or cannot provide. For example, no pets were nominated as being able to help with a bullying problem. Dogs were seen as a useful protector in a scary situation whereas cats were not. Perhaps because of dogs being more active play companions than cats, dogs were also ranked highly as sharing the special secret of

visiting a secret garden with subjects. Small pets achieved high rankings only as non-judgmental relationships in front of whom a child could rehearse or practice and not feel silly if he/she made mistakes. These small pets did not feature in any of nominations for other stories and, in view of the rather unreliable nature of this particular story, this may be due to a pet such as a hamster or a budgie residing in the room in which a child envisaged his/her practice occurring.

However, the functions perceived as available from cats and dogs strongly suggests that children regard these as potential sources of comfort and/ or esteem. Cats featured particularly highly as providers of comfort if a child were ill in bed, and also as esteem providers when a child had experienced a trying day or was in need of esteem repair. Dogs were also regarded as comforters when ill (although not as highly as cats) but were especially perceived as serving a protective function in a frightening situation, and as playmates with whom to share a special secret. This would appear to suggest that pets play a specialist role in children's support networks that, although not confined to the provision of just one function, is limited by the child's appreciation of the animals' limitations. Provision of comfort, esteem and play appear to be the dominant roles for these pets.

It is also striking that cats and dogs consistently achieved higher rankings than many of the subjects' human relationships, notably non- immediate family members such as aunts, uncles and grandparents. This would indicate that pets are regarded as close family members not only through residing in the same house, but through the functions they provide.

8.4 Discussion

The aims of the study were to examine the significance of pets in children's social networks and the functions they may serve as perceived by the children using a

methodology designed to place this in a context of the roles and functions available from human relationships in the children's social networks.

The methodology was found to be highly satisfactory in that it enabled children to generate their own choices of relationships, whereas other studies into relationship function that have used relationship types as prescribed by the researchers. The results leave little doubt that children are able to both identify special relationships and to discriminate between them to obtain appropriate support if needed. The methodology is therefore valuable since it presents a way in which children who are often considered as too young for self-report measures or for strict ranking procedures to be used can be interviewed. The stories and illustrated story-boards were much enjoyed by the children, (especially the stories concerning putting annoying people in the bin) and they found the procedure easy to understand since it did not involve them making numerical rankings themselves. Rather the procedure involved a 'best vs the rest' process where children were asked to select from their Top Ten people, portrayed as cut out figures, the 'best' to turn to and, if they were not there, the best of the remaining and so on.

The results confirm Reid et al's (1989) findings that children's social networks contain both generalist support providers and specialist support providers. Generalist providers are those relationships that provide differing forms of support across a range of support needs. These are usually close relationships and relatively few in number, such as parents or significant care givers and close friends. Specialist providers are those relationships whose support functions are confined to relatively few domains of need, such as teachers providing instrumental help or advice, and friends who provide companionship but few other support provisions. Similar findings emerged in this study with strong generalists being identified as parents and best friends, and strong specialists as teachers and friends. Siblings were also identifiable as specialist providers. In all cases this was of mutual annoyance and

conflict with the subject but, with special regard to older siblings (especially brothers), possible functions as protectors or helpers with a problems.

The results also confirm the claims of Bryant (1985) and Blue (1986) that pets may assume significant relationships in children's social networks, although this was only apparent for cats and dogs. In the terminology of Reid et al (1989) pets could be regarded as specialist providers of support in that they were perceived as offering comfort and esteem support. Cats were especially seen as comforting when ill or good for getting over a bad day, whereas dogs were regarded as comforting when the child was ill and through protection if the child were scared. Dogs were seen as companions/playmates for special ventures. Thus it would appear that dogs and cats offer special relationships for provision of psychological forms of support (i.e. making one feel better about oneself) but not for the more practical problems a child might have to deal with. The fact that cats and dogs frequently ranked higher than many human relationships suggests the value that children place on their pets and the functions they serve, and that studies examining children's networks would be advised to include any pets that may be owned.

The results of this study are complemented and supported by a study conducted as a final year undergraduate project that took place concurrently. Using the same methodology as described in the above study, Fisher & Meinke (1996) investigated three dimensions of support; emotional support, esteem support and companionship and their provision as perceived by children aged 6-7 years old, recruited from a school in Oxfordshire.

Aspects of emotional support provision that were investigated were obtaining comfort when the child had hurt him/herself; confiding about something that bothered them; feeling upset; sharing a special secret; and who to turn to in order feel safe if frightened. Esteem support provisions examined were being made to feel good about

oneself at times when things go wrong; being praised for doing something well; feeling needed; being thought well of even though the child had been naughty, and wanting to tell someone of an achievement.

Companionship provisions examined were having fun with someone and who a child would wish to be with if they felt fed up on their own. Appropriate stories were adapted from the popular 'Mr. Man' books by Roger Hargreaves and presented as story boards, or by acting out a story with playmobile figures. The same methodology was employed whereby children generated their own overall list of relationships and then selected their Top Ten. These were then made into cardboard figures for the children to arrange on a table top during the telling of each story. The methodology differed only in that the use of figures/photographs from mail order catalogues used the bodies only, with the children drawing in the heads and faces for each of their ten relationships. As before, children were told a story and asked to imagine that they were in the same situation as the character in the story. They were then asked who of their ten characters they would go to first, this character then being removed and the child asked to select their next choice. e.g. "When you are frightened, who is best at making you feel safe?" When the character was removed the child would be asked "If that person wasn't there when you wanted them, who would be the best out of these" (indicating the remaining nine characters).

In common with the current study, Fisher and Meinke found that some family members such as aunts, uncles and grandparents achieved relatively low ranks across all of their stories. Perhaps because there were no stories examining conflict or quarrelling, siblings were also largely absent from the top ranks. Fisher and Meinke also found that parents and friends were frequently featured as strong generalist providers.

Fisher and Meinke report that some pets frequently ranked higher than a number of human relationships. These pets were predominantly cats and dogs. With the exception of one subject with much loved fish, no small caged pet or bird achieved high rankings for any of the stories. In this study, too, it was found that dogs and cats provided strong support functions across a number of dimensions but not in situations that demanded practical help, such as when action is needed to deal with something that a child found worrying. Both dogs and cats featured as top ranks for sharing an exciting secret and, along with a best friend, for having special fun with and still liking a subject if they had been naughty. Dogs again featured highly as potential protectors to make a child feel safe in a frightening situation, whilst cats were also found in this study to be valuable in being able to provide esteem support at times when a child has experienced things going wrong for them. Cats were also considered as very valuable for cheering a child up when upset.

Although many of the stories used in the Fisher and Meinke study do not exactly correspond to those used in the current study, they are sufficiently similar to be able to draw comparisons. To a very great degree the two studies support each other's findings that pets appear to have significance in a child's social network and that the roles and functions served by cat and dog relationships are mainly concerned with the provision of comfort, esteem and/or companionship, but not of tangible or practical help. This would indicate that, in both studies, children were able to realistically assess the relative appropriateness of functions available from their relationships and to match these with the needs presented by the stories.

Chapter 9: Relationships between young people with autism and their pets (study 8)

9.1 Introduction

Pets are often regarded as especially beneficial to certain special populations such as older people, young children and people with physical or psychological disability. Popular reporting of these benefits has frequently made claims that people with autism benefit from pet ownership. In particular, it is implied that people with autism, a condition that is characterised by profound difficulties in the formation of social relationships, can relate to pets in ways that they cannot with people. Yet these claims exceed that which can be supported by empirical evidence. We have been able to find only very few published studies. One paper reports an increase in pro-social behaviour in children with autism during a program of planned animal intervention with a friendly dog, but which deteriorated after the programme sessions (Redefer & Goodman, 1989). A case study reported that a child with autism appeared to benefit from swimming sessions with a dolphin (Smith, 1983). There appears to be no evaluation of how pet relationships in people with autism may differ qualitatively from their often difficult relationships with people.

The motivation to conduct this study stems from the disparity between the claims for the advantages of pet ownership for children with autism and the dearth of evidence to support those claims. We are concerned that popular reporting has constructed a lay belief in which pets are seen as having a special ability which could be termed a 'Heineken effect' where, to paraphrase the famous advertising slogan, pets can reach the people that other people cannot reach. Without firm evidence to support this, acceptance of such claims could have a number of serious repercussions for human and animal welfare if an animal is acquired solely in the hope of an 'improvement' in a family member with some psychological disorder. We have experience of one case where a dog had to be rescued from a home where it was terrified of a child with

emotional disorder. Also, discussions with clinicians suggest that many people with autism may be afraid of animals or dislike the change to routine, often very upsetting to a child with autism, that acquiring a pet may bring. These issues, and theoretical considerations, make it important to carefully evaluate claims that people with autism can build some form of relationship with pets.

9.1.1 Autism

Autism is a severe disorder of communication, socialisation and imagination. It is a biologically based, developmental disorder which lasts throughout life (Happé, 1994). There is currently no physical treatment. Diagnostic criteria for the condition (DSM-III-R, 1987) are divided into four sections:

1. *Qualitative impairment in reciprocal social interaction*

- a) marked lack of awareness of the existence or feelings of others;
- b) absence or abnormal seeking of comfort at times of distress;
- c) impaired imitation of others; no or abnormal social play;
- d) gross impairment in ability to make peer friendships).

2. *Qualitative impairment in verbal and non-verbal communication, and in imaginative activity*

- a) absence or abnormal communication;
- b) markedly abnormal non-verbal communication such as lack of eye contact, stiffening when held, not greeting people;
- c) absence of imaginative activity such as playacting;
- d) marked abnormalities in speech production, such as in volume, pitch and intonation; marked abnormalities in the content of speech, including stereotyped and repetitious use of words or immediate echolalia; marked impairment in the ability to initiate or sustain a conversation with others despite the presence of adequate speech.

3. *Markedly restricted repertoire of activities and interests*

- a) stereotyped body movements such as rocking or hand flicking;
- b) preoccupation with parts of objects such as spinning the wheels of toy cars;
- c) marked distress over changes in trivial aspects of the environment such as when an object is moved from its normal position;
- d) unreasonable insistence on following routines in precise detail and being upset if this is changed;
- e) markedly restricted range of interests such as only interested in lining things up, or amassing facts about trains.

The fourth criterion is that the onset is during infancy or childhood. Of these items eight must be present to secure a diagnosis of autism, two of which should be drawn from the items describing impairment in reciprocal social interaction.

The most striking manifestations of autism are the impairments in social communication and the formation of relationships. To date there is still considerable debate on the nature and origins of autism (Boucher, 1995). A number of contemporary models of the nature of the core psychological deficit focus on impairments in the ability to understand the significance of beliefs, desires, emotions and thought processes in other persons. The difficulties that autistic people have in establishing close social relationships are easily understood in these terms. It is thus intriguing that there are a number of reports of children with autism forming what appear to be close relationships with pets.

Collis & McNicholas (1998) have articulated an assumption that it is unlikely that the human species has evolved or acquired a set of psychological processes whose primary function is to serve relationships with pets. Rather it is much more likely that processes are borrowed from those underlying human-human relationships and utilised for person-pet relationships. If this view is correct it would be surprising and

intriguing if people with autism, who have severe difficulties in social communication and the formation of social relationships with people, were better able to form social relationships with pets. To focus our investigation of reported person-pet relationships in our subjects, we formed two alternative hypotheses. Firstly, that any apparent relationship with a pet would *not* differ greatly from relationships with significant people in the subjects' families or networks. Rather that the family may be motivated to report that a relationship was formed with a pet because this would detract from a sense of abnormal functioning on the part of their child. Secondly, we hypothesise that an apparent relationship with a pet could be attributable to the pet itself. It is quite possible that an insistent cat or very sociable dog that demands attention could initiate and maintain interactions that could give the appearance that a relationship had been formed.

In order to test whether or not relationships between persons with autism and pets showed similar features (or lack) to the relationships they had with people, we elected to compare the relationship the person with autism had with a) his primary carer; b) with one other significant person in their life; and c) their pet. Since we are focusing on the nature of a relationship with a pet animal we chose to investigate subjects who owned a pet rather than observe children with autism with a visiting pet.

Dunn (1993) gives a comprehensive account of components of child relationships which we have found useful in our parallel work on normal children's perceptions of pets as significant relationships, and the supportive functions that are served by pets to 7-8 year olds. These relationship features, together with features and behaviours from DSM-III-R, formed a core of relationship-like qualities for investigation. These features and behaviours were greeting; seeking out; talking and sharing of feelings; play; sensitivity to others; emotional comfort; sharing humour; conflict; expression of emotions; confiding; companionship and caregiving. We would expect that all would be present across a variety of relationships in normal young persons. However, given

DSM-III-R diagnostic criteria for autism we would not expect young people with autism to demonstrate those features of relationships that appear necessarily to involve an understanding of thought processes in other persons such as the sharing of feelings, emotions and thoughts.

9.2 Method

9.2.1 Recruitment

A letter was placed in a newsletter for carers of people with autism residing in the Midlands area of the UK. The letter asked for parents/carers of children or young people with autism who appeared to have a good relationship with a household pet to make contact with the researchers at the University. Three families were recruited in this way and interview times were arranged with the primary carer (in each case the mother) when it would also be possible to meet the person with autism and his pet. Each interview lasted between two and three hours. All subjects had a firm diagnosis of autism.

9.2.2 The interview

The interview schedule comprised five sections. Information regarding sections 2-5 was communicated in advance to the interviewee to allow time for consideration of their responses. The five sections were as follows.

- 1) The CARS checklist for diagnostic symptoms of autism (Schopler, Reichler & Renner 1988).
- 2) Background information about the pet with whom the person with autism was regarded to have a relationship. For example, the type of pet, its name, age, length of ownership, reasons for acquiring the pet (perhaps it was due to publicity that it may be beneficial to their child) and whether it was regarded as belonging in

particular to any person in the family. We also asked about any other pets in family, past and present, and, in the case of previous pets, the reactions of the person with autism upon its death or loss.

- 3) The primary carer was asked to reflect on how they would describe the characteristics of the relationship the person with autism had with a) themselves (the primary carer); b) one other person important to the person with autism; and c) the pet. In particular, the interviewee was asked to focus on similarities and differences in behaviour with each of these three relationships.
- 4) These similarities and differences were then explored with regard to a number of behaviours and features associated with relationships. The interviewee was asked whether the person with autism displayed these behaviours and features, to whom, in what way and whether this was consistent.
- 5) The final part of the interview asked the interviewee to reflect on the pet's behaviour towards the person with autism and towards other members of the family. For example, whether the pet initiated interactions, solicited attention, showed affection or asked to be fed or be let out, and whether the pet showed particular preference or avoidance for particular people in the family for any of these behaviours.

9.2.3 The subjects

To preserve confidentiality the names of the subjects, their pets and their families have been changed. The outline information presented for each subject summarises sections 1-3 of our interview schedule.

Subject 1

Andrew is 22 years old, living with his mother, step father, and two older siblings. He was diagnosed as autistic at the age of 11 years. On the CARS rating scale he exhibited moderate to severe autistic symptoms.

Andrew is very articulate and intelligent. He was present for most of the interview. Two of the family's six cats are regarded as Andrew's. The other cats kept by the family are largely ignored, as are the two family dogs. The family has always kept pets and there was no particular reason for acquiring them. However, Andrew has a video about cats which concludes with a statement that cats may help people with autism. He believes this and talks to his cats about his condition.

Andrew's main pet is a three and a half year old black and white cat called Cindy. The second cat is a six month old black cat called Sooty. Andrew has had a long term preference for all black cats and is impatient for Sooty to grow up. He has no interest in kittens. A number of his previous cats have been killed on a nearby road. He has shown no distress to these events, only agitation that he is without a black cat.

In spite of this, his relationship with his cats is described by his mother as characterised by more affection and tolerance than he displays towards any human relationship. He kisses and cuddles the cats and spends considerable time holding and petting them. He also imitates the cats by rubbing noses in greeting them. In contrast he vigorously resists any form of touch from humans relationships. Andrew also verbalises his feeling for the cats, saying that he loves them and that they are special, something he never expresses towards people.

Andrew's mother describes the relationship between herself and Andrew as fraught with conflict and a constant challenge to keep authority over his actions. Andrew is aware that he is autistic and continually demands explanations or focuses his distress on her. There is little affection displayed by Andrew towards her and he frequently hides his feelings from her except to voice his negativity towards her.

The person nominated as the most important person in Andrew's life apart from his mother is his maternal grandfather. Andrew appears to have some concept of relational hierarchy in that he sees his grandfather as having authority over his mother. He uses his grandfather as a repository for his dissatisfaction with his mother. Although less challenging in his behaviour toward his grandfather, Andrew shows no voluntary displays of affection, although he clearly enjoys his grandfather's visits.

Subject 2

Robert is 12 years old and lives with his parents, his 10 year old sister and his maternal grandmother. He was diagnosed as having autism when he was nine years old. On the CARS scale he was rated as severely autistic. He is also epileptic. Robert is intellectually able and his speech and vocabulary is good, although his intonation is stilted. However, he rarely speaks. He avoids eye contact, holding his head to one side to avert gaze. Robert's movements are jerky and uncoordinated. He can be violent but this is improving since the prescribing of anti-convulsive sedatives for his epilepsy.

Robert has a two year old black cat named Billy. He is interested in all animals and enjoys visits to farms. His mother observes that he engages in eye contact with animals and adopts a less jerky, awkward way of moving. Owning Billy was Robert's own idea. His parents agreed to having a pet because of Robert's relationship with a dog owned by the family until it died when Robert was seven years old. Robert showed great affection for the dog as he grew up. He talked to the dog very much more than he did to his family, telling her of 'bad days' at school which he did not disclose to anyone else. At times when he was unhappy he would curl up beside her in the dog's basket.

The dog was euthanased at the age of eleven due to failing health. Robert, who rarely displays emotion, cried intensely over a period of weeks and locked himself in his

room. He blamed his parents for the dog's death even though he appeared to understand that she was old and ill. For some time afterwards, when visiting certain places, he would break his silences to remark that "Poppy used to come here". It was not until the family moved house that he stopped referring to Poppy.

Robert's relationship with Billy, his cat, is affectionate and tolerant. He has never displayed violence towards it, unlike his behaviour towards his family. He talks directly to his cat in contrast to his avoidance of speech with people. The cat is most often found in Robert's room with him. This appears to be as much the cat's choice as Robert's. Robert enjoys physical contact with his cat although he is deeply resistant to physical contact with people. Attempts to touch Robert have frequently precipitated violent episodes. Although his relationship with his cat is very positive, Robert's mother considers it less intense than the earlier relationship with the dog.

Robert's mother regards the relationship between herself and Robert as characterised by minimal contact on his part, interspersed with aggressive episodes. Robert rarely speaks or looks at her. He has adopted a posture of angling an elbow towards her to maximise distance between them and to avoid possible attempts at touching him. Robert spends a great deal of time in his room and avoids mixing with family whenever possible.

The person nominated as the most significant person in Robert's life apart from his mother is his ten year old sister Jane. Although Robert speaks to Jane more than to the rest of his family, this is considered to be rather less than to his cat, and is most frequently via a favourite Teddy Bear who Robert makes 'talk' to Jane about himself. Usually this is when Robert wants Jane to do something for him. Jane is a little afraid of Robert as he has been violent towards her. He also bullies her and makes demands of her. Robert's mother is careful to intercept when she considers Jane needs to be 'rescued'.

Subject 3

Mike is eleven years old and lives with his mother and his nine year old brother, Simon. Mike was originally diagnosed as having semantic-pragmatic disorder but later this was diagnosed as autism. On the CARS rating scale he exhibited mild to moderate symptoms of autism.

Mike's pet is young grey rabbit, aged about one year, named Gemma. He has owned her since she was eight weeks old. The decision to acquire a pet was solely Mike's. The family is not animal oriented and Mike's mother was reluctant to have the extra responsibility of a pet if it Mike was unable to unwilling to cope with its care. It is thought Mike became interested in animals through his respite carer. Mike made a careful study of books on pets and decided to have a rabbit.

Mike spends as much free time as he can with Gemma. She is allowed into the house and often sits on his lap whilst he is eating or watching TV. He fetches her from her cage as soon as he gets up in the morning and when he comes home from school. No-one else is acknowledged at these times. Mike talks a great deal to Gemma, far more, his mother reports, than he does to people. His speech, often loud and aggressive to his family, is gentle with Gemma. Mike spends a large part of his time holding and cuddling Gemma. This close contact is important to Mike, although he, like the two previous subjects, is very unwilling for people to touch him. Mike cares for Gemma himself and never forgets to give her fresh food and water twice daily. Although he dislikes cleaning her out, he co-operates with his mother's help.

The relationship with Gemma is regarded as highly affectionate and characterised by tactile behaviours and verbal expression of affection. There have been no previous pets in the family but Mike's mother 'dreads' anything happening to Gemma since she anticipates this would cause Mike severe distress.

Mike's mother sees Mike's relationship with herself as 'aggressive, demanding, unfeeling and hurtful'. She often feels that she is not as real or as loved by Mike as his favourite Teddies. She often feels excluded from his life or not needed except for practical help. The one exception is her role in calming him when he has had a nightmare.

The other significant human relationship was nominated as Mike's respite carer known as 'Uncle John'. The relationship with Uncle John was seen as positive and characterised by involvement in mutually interesting pursuits. Mike's mother regards this relationship as more 'normal' than she has with her son. She attributes this, in part, to a male to male relationship but also that it is because Uncle John is able to give Mike his undivided attention. Mike's relationship with his brother Simon is regarded as antagonistic and coloured by mutual dislike.

9.3 Findings

9.3.1 Comparison of relationships with primary carers, nominated persons and pets.

Thirteen aspects of child relationships with others (Dunn 1993) were investigated. These are summarised in Table 9.1. The differences between behaviours in human and pet relationships are striking, with the majority of positive features occurring only in pet relationships or, where in both, only rarely in human relationships.

Behaviour or feature	Never (extremely rare in any relationship)	Only in human relationship	Only in pet relationship	The same for pet and human relationship	In both but more in human relationship	In both but more in pet relationship
talking (i) factual	Robert			Mike (tells things to people and pets)	Andrew (mainly requests for help)	
talking (ii) when happy	Robert		Andrew (always seeks cats when happy)			Mike (rare in people relationships)
(iii) when sad			Andrew Robert			Mike (only talks to people if he needs their help)
appropriate play			Robert (paper ball thrown for cat)	Mike (mainly parallel play)		Andrew (rhyming games with mother; imaginative games with cats)
sensitivity to others e.g. noticing needs, illness	Andrew		Mike, Robert (both noticed illness in pets and changed behaviour toward them)			

Table 9.1: (continued from previous page) Behavioural features of autistic children's relationships with people and with their pets

Behaviour or feature	Never (extremely rare in any relationship)	Only in human relationship	Only in pet relationship	The same for pet and human relationship	In both but more in human relationship	In both but more in pet relationship
expression of emotions (i) positive e.g. affection, love			Robert (hugs, kisses, tells cat he loves him)			Andrew (one human instance) Mike (rare with people) Both hug, kiss, tell pets they are loved, special
(ii) negative e.g. anger, aggression		All subjects express negativity only to people				
confiding secrets e.g. 'special' secrets, or troubles not requiring practical help			Andrew Robert (but more with previous dog; occasionally teddy)			Mike (rare in people)
companionship			Andrew Robert(both in preference to people)			Mike (enjoys human company)
caregiving	Andrew		Robert (voluntarily feeds cat occasionally)			Mike (very rare with people, but feeds and cleans rabbit regularly)

Table 9.1: (continued from previous page) Behavioural features of autistic children’s relationships with people and with their pets

Voluntary greeting

For all subjects, the only voluntary greeting made was to their pet. This was almost always accompanied by affectionate gestures such as petting or cuddling. Human relationships were rarely acknowledged unless coaxed to do so, which was not always successful.

Seeking out

The subjects also sought out their pets far more than they did either of the two human relationships under discussion, except when the subjects wanted practical help. Mike and Andrew always sought their pets when in a happy mood, during which they cuddled their pets and told them what was making them happy. At these times they tended to exclude people. When unhappy, two subjects also sought out only their pets to cuddle and talk to. Andrew would sometimes look for his mother or grandfather to make complaints but he, like the other subjects, was more likely to want to hold his cat when he was feeling sad than to turn to a human relationship.

Talking

All subjects talked a great deal more to their pets than to people. In all cases the manner of speech differed from that used with humans, being softer and more coaxing, and lacking the demanding, often aggressive, styles (described by Mike's mother as an 'I hate you tone') adopted toward people. All subjects are reported to maintain eye contact with their pets whilst talking to them, although this is avoided in most human interactions by both Mike and Robert. Their verbal communication with people was largely confined to topics of a factual nature or requests for help. In contrast, topics of a happy nature, for example some event that had pleased the subjects, were mainly communicated with pets. Subjects' families would often only hear of these events indirectly through others. Robert rarely speaks, but he is heard to talk to his cat whilst in his room, especially when he seems upset or sad. Mike and Andrew also talk of their sad feelings to their pets rather than to people, although

Mike will tell his mother if he thinks she can help. As with seeking out and greeting, talking with the pet is accompanied by affectionate gestures not displayed toward people.

Play

Play behaviour is frequently abnormal in children with autism, often taking the form of a preoccupation with just a small function of the toy (e.g. the repetitive spinning of the wheel of a toy car) or the methodical arrangement of articles in rows. Imaginary play is usually absent. None of the subjects had ever exhibited normal play with people. The need for turn taking and co-operation with others ruled out most forms of family play. Andrew was able to play word rhyming games with his mother but not other forms of play. Robert enjoys aligning boxes and toy farm sheds, and Mike plays with micro cars, the fascination being the minute detail of each tiny model. With pets, both Andrew and Robert showed appropriate play. Robert rolled paper balls for his cat to chase. He also used to throw sticks and balls for the dog. There is no evidence that this was due to the preoccupation with the repetitive acts of throwing that can be common in children with autism. Andrew also showed some indication of imaginative play, calling his cats 'lions and tigers', and making tunnels in the bedclothes for them to 'jump out of the jungle' at him. However, he also showed inappropriate forms of play such as holding his cat as if it were a guitar and strumming it while he listened to music. Mike sometimes enjoys going out to play with children living nearby. This is usually to ride his bike or play on his skateboard as he is unable to join in games requiring co-operation. At these times he does not involve his rabbit as he is afraid she will get lost or hurt. When playing in his room he likes to have Gemma with him but does not involve her. In each case the involvement of the pet in play was gentle and non-controlling. This contrasts with reports of attempts to engage the subjects in play such as board games when the lack of tolerance and turn taking made such attempts usually terminate in tantrums.

Sensitivity to others

A main feature of autism is the lack of ability to gauge the needs or desires of others. We did not anticipate that any subject would display any sensitivity to either pets or to people in their lives. Andrew clearly demonstrated this lack. He was unable to distinguish when his mother was upset or ill and to modify his behaviour accordingly. He also showed no awareness of when his cats wished to be free from his custody or if they wanted to be fed, nor did he show any signs that he noticed when they were ill or injured. Whilst Robert and Mike appeared to show a similar lack of sensitivity in their dealings with people, both seemed to display some understanding of their pets needs. This is somewhat equivocal in Robert's case. Robert seems to understand when his cat wishes to be allowed off his lap or to be set down after being held. He also is aware when his cat is asking to be fed, but, although he will set down a bowl for him, does not always remember to put food into it! Mike, however, has clearly shown that he is aware of his rabbit's needs. When Gemma fell and injured her leg, he voluntarily left her to lie quietly for a number of days whilst he sat and stroked her and talked to her. Similarly he was the first to notice that she was lethargic and unwell one morning and asked for help to make her better.

Seeking of emotional comfort

No, or abnormal, seeking of emotional comfort is also one of the DSM-III-R diagnostic criteria for autistic disorder, yet seeking and obtaining emotional comfort from pets was reported for all our subjects. This was when they were upset or feeling sad or had some bad experience with others. Their pets were reported to soothe and calm them. Only when there was specific need to turn to a person did they do so. For example, Mike suffers from nightmares and this is the only time he seeks his mother's comfort. Andrew is occasionally frightened about new experiences or people and will turn to his mother, although this is mainly to demand information. For tactile comfort all subjects turned to their pets, disliking physical touch from people. Of course, it cannot be certain that any of them derived emotional comfort from these actions,

although our work with normal children suggests that pets are frequently regarded as a source of comfort.

Hiding feelings

All our subjects were described as hiding feelings from people, being very resistant to talk unless they specifically wished to. In contrast, all subjects confided in their pets about most of their feelings, their wishes and fears, only rarely disclosing these to people.

Sharing humour

Sharing humour is clearly difficult for a person with autism since this demands that they have some appreciation of what another person thinks. All subjects were unable to understand jokes made by other people and their own humour was idiosyncratic and incomprehensible to others. Andrew was sometimes able to share funny rhymes with his mother but this was based on word play rather than an appreciation of humour. Mike was very amused about a time he tried to smuggle his rabbit to his room and he tells this story to the rabbit rather than to other people. There was no real evidence of shared humour in any of our subjects.

Conflict

Pet relationships were characterised by a lack of conflict and intolerance, unlike relationships with people which were frequently hostile, uncooperative or aggressive. For example, Robert tolerates his cat disturbing, even breaking, his arrangements of boxes and toy houses. Although he will shout 'No', he does not strike the cat as he would if this were done by his sister. All subjects were patient with their pets and did not force them into activities in which they did not wish to co-operate in, nor did they become upset if the pet did not co-operate.

Expressing emotions

In expressing emotions, positive emotions such as affection and love were directed markedly more towards pets than to people. All subjects demonstrated affection to their pets through kissing, cuddling and telling the pets that they were loved. These expressions were rarely, if ever, displayed to people. Robert showed no affection except to his cat. Andrew has only once demonstrated affection to a person. This was to someone who was leaving the area. Andrew hugged him and said that he 'loved him a thousand cats', presumably Andrew's way of expressing deep affection. It is not clear why he appeared to use cats as a currency to measure affection, and there has been no recurrence this. Mike rarely shows affection to people, although if he has recently been given a present he will sit on his mother's lap or cuddle her. Negative emotions, such as anger, frustration, and aggression were only ever apparent in human relationships. There were no reports that these were shown to pets in any way, nor were pets punished by the subjects, even if they committed a 'thumping offence' as one interviewee expressed it. Pets were also never ignored or 'blanked out', common in human relationships. Rather pets were usually acknowledged and treated favourably.

Confiding

All subjects confided in their pets about most of their feelings, their wishes and fears, only rarely disclosing these to people.

Companionship

All subjects showed a preference for the companionship of their pets. All subjects spent large amounts of time in their rooms, seeming to prefer to be alone than with their family. In all cases they would normally take the pet with them. Subjects very rarely sought the company of people. Often the animals were talked to about whatever the subject was doing. There was no human parallel for this behaviour. Although

Mike went out to play with other children, it is very unclear whether he found companionship with these children since most of his activities, especially cycling or skateboarding, were performed alongside other children with little or no communication between them.

Caregiving

Only Mike demonstrated complete care for his pet, always remembering to feed and clean his rabbit regularly. He only occasionally showed any caretaking or helpful behaviour (such as offering to wash up plates or fetch a drink) towards people, even if his mother or brother were ill. Robert sometimes fed his cat or let it out but this was irregular, perhaps because he is only home at weekends. Andrew does not take part in any caregiving for human or pet.

9.3.2 Behaviour of the pet

Our final part of the interview consisted of questions about the pets' behaviour toward each subject. In particular we wanted to explore whether any apparent relationship between person with autism and a pet could be primarily attributable to the insistent behaviour of the pet in wanting attention or to be noticed.

Our conclusion was that this was unlikely. Andrew's cats actively avoided him wherever possible, although were very sociable to other people. They displayed tolerance but not affection towards him, and rarely approached him for any reason whatsoever. Robert's cat showed preference for Robert's mother, although he was clearly more fond of Robert than he was of Robert's sister or grandmother. He also had a liking for Robert's room but it does not appear this caused soliciting of Robert's attention and thus distorted any of the relationship behaviours observed. The situation is rather more difficult to assess in Mike's case since his rabbit was usually confined to her cage and could not therefore voluntarily approach or avoid him. While she was

out, Gemma did seem more relaxed in Mike's arms than she did in anyone else's (although this could be put down to simply being more accustomed to him) but there seemed to be nothing in her behaviour that could explain his behaviour towards her. It would appear that, in these three cases at least, the apparent relationship between person and pet could not be explained by the initiation and/or maintaining of certain behaviours at the insistence of the pet.

9.4 Discussion

What was apparent from our investigations was that all subjects displayed behaviours toward their pet that were absent from their relationships with people. All these behaviours were positive. In particular, there were spontaneous, appropriate acknowledgement and greeting; seeking out to share a happy mood or for emotional comfort, disclosure of feelings; pleasure in tactile contact and absence of conflict, hostility and aggression. Most appropriate play was with pets, as was most affectionate behaviour. Caregiving and sensitivity of needs, although not present in all our subjects, was primarily directed towards pets only. In contrast, relationships with humans were characterised by minimal interaction, negative affect, lack of sharing of thoughts and feelings; avoidance of physical touch and approached only in response to specific need. Interviewees all expressed that they felt any approach to a person was a 'last resort' for subjects.

All subjects fulfil DSM-III-R diagnostic criteria for autistic disorder when these are applied to human relationships. However, all subjects demonstrated some behaviours towards their pets from among those that the diagnostic criteria indicate are often absent. As examples, subjects did not demonstrate a lack of awareness of the existence or feelings of their pet, since all acknowledged them and did not coerce them into unacceptable behaviours. Indeed, Mike, and to a lesser extent Robert, were reported to show awareness of their pets' feelings. All sought their pet for comfort at times of distress or sadness, and all demonstrated appropriate play with their pet,

although this is less clear with Mike and his rabbit. Non-verbal communication such as smiling, eye contact and touch were present only in pet relationships. Speech towards pets was more normal in both content and intonation.

The presence of such behaviours suggests that children with autism are not incapable of displaying these behaviours, but for some reason cannot or will not display them towards people. All subjects have a firm diagnosis of autism and all demonstrate other clear diagnostic criteria for the disorder, so the question arises as to why these subjects are able to display behaviours and features of relationships with pets that do not exhibit towards people. Moreover, what might this mean in our understanding of autism?

Our current work with normal children's perception of pets as significant relationships and providers of support and companionship has indicated that normal youngsters frequently turn to pets as sources of comfort when ill or worried, or as confidants for their thoughts and secrets. In contrast, these children do not seek pet support when they perceive a need for a practical solution to a problem. Rather, pets are seen as safe recipients for information they are unwilling to disclose to people. We have termed this distinction a difference between 'airing' a problem, where it is just the telling that brings some form of comfort, and the 'sharing' of a problem where it is important a particular person is told in order to effect a solution. Our subjects in this study also appear to make this distinction. They deviate sharply in the extent to which they access human relationships for anything other than practical help. We found no evidence that pet ownership for people with autism improved human relationships or 'primed' interactions with other people as suggested by Redeker & Goodman (1989).

Some behaviours of our subject may be explained without recourse to the existence of a relationship. For example, pleasure in the touch of an animal may be due to the stimulating sensation of its fur, tongue or smell, as pointed out by Redeker &

Goodman (1989). Since people with autism lack ability to read the intentions behind human actions, the resistance to human contact may arise through occasions when he has been held against his will, such as for dressing or washing. However, other behaviours with pets are less easily explained mechanistically.

Our subjects clearly do not see pets as inanimate objects, nor is there any evidence that their families are overstating the extent to which subjects interact with their pets, or that any apparent relationship is being initiated and maintained by the pets' behaviours. We have to conclude that our subjects would appear to demonstrate relationship-like qualities that do not occur, or only rarely occur, in human relationships. As yet we can only speculate why this may be. It might be, for instance, there are qualitative differences in the processing required to 'read' social communication from the human species than from animals. Social signals from animals are simpler and the reduced processing load may permit a degree of social understanding to take place than might otherwise not be possible. Person-pet relationships are not truly reciprocal. This removes some of the disadvantages that people with autism experience with human relationships, enabling positive expression in a relationship that has no association with conflict.

We wish to conclude our discussion with some caveats. Our subjects were all intellectually able and none had additional learning disorders common in people with autism. We cannot speculate how our findings may generalise to people with lower level functioning. All our subjects had been in contact with pets for all of their lives, either through family pets or through those of a respite carer, and we would argue strongly that this differs from the introduction of a pet into a home for the first time. On the strength of existing evidence we do not advocate the acquiring of a pet for a person with autism unless it is certain that the pet is wanted by all members of the family and will not be subject to inappropriate demands.

Since this study may well be the first empirical evaluation of claims of a person with autism's ability to form a relationship with an animal we are aware that our findings may be misreported and overstated. We urge caution in the interpretation and generalisation of our findings. Instead we ask that it be accepted for what it was intended to be, a small scale but detailed investigation into the nature of the relationships between young people with autism and their pets. However, we believe it is of considerable importance both to the study of person-pet relationships and to the study of autism to make further investigations into the nature and content of relationships between people with autism and their pets.

Chapter 10: The relationship between people with physical disability and their service dogs (study 9) : 'More than just a working dog'

10.1. Introduction

10.1.1 Assistance dogs in the UK.

Trained assistant dogs are now established as a means of enhancing the independence and mobility of people with a variety of disabilities. The assistance dog movement developed in the United Kingdom in 1931 when the first four dogs were trained to guide blind persons. Shortly after this the Guide Dogs for the Blind Association (G.D.B.A.) was formed. This Association underwent rapid expansion in the 1950's, and is responsible for the training of all guide dogs for the blind- of which there are now over 4000 - in the United Kingdom. Since its conception, the G.D.B.A. has developed considerable strengths in training skills and the financial strengths, through public support, to enable it to extend its services beyond the provision of dogs. These include holiday hotels, adventure training and rehabilitation courses for the visually impaired.

The success and expertise of the G.D.B.A., and its acceptance and approval by the British public, has led to the establishment of other organisations in the UK to train assistance dogs for people with other disabilities. Hearing Dogs for the Deaf was formed in 1982, based on similar American organisations, to train dogs to assist deaf people. It now has two centres where dogs selected from animal rescue centres are trained. Using a 'touch and tell' technique, dogs alert their owners to specific sounds and lead them to the source of the noise, such as the doorbell or the baby crying. The organisation has achieved much in its relatively short history, and is becoming widely recognised and supported.

Dogs for the Disabled was formed in 1986 by Frances Hay who taught her own dog elementary tasks to assist her after she had a leg amputated due to bone cancer. The organisation has now trained over 80 dogs with 60 working as assistance dogs to people with a wide variety of physical disabilities. Dogs are trained to carry out tasks such as opening and shutting doors; fetching and carrying objects such as newspapers, letters, or cordless telephones; operating switches and alarms. The organisation is based near Warwick and works closely with the Guide Dogs for the Blind Association, sharing training facilities, exchanging staff and retraining dogs found unsuitable for guiding.

A smaller, but important, contribution to the assistance dog movement in the UK is the organisation Support Dogs, based in the North of England. People with disabilities are able to have their own pet dogs trained to act as assistance dogs, performing many of the tasks that Dogs for the Disabled carry out. This group has also shown a particular interest in training dogs to detect signs of onset of epileptic seizure in their owners so that the dogs can attract help to their owners prior to the onset, or alert their owners to take action to prevent injury during a seizure.

The various branches of assistance dogs have now formed an umbrella organisation of Assistance Dogs UK. to promote the awareness of assistance dogs.

The commitment of the recipient in establishing and maintaining a good relationship with their dog is regarded as a vital component of the successful working unit and this is carefully monitored by the training staff during routine check-ups after a dog has been placed with a recipient. Such contact between owners and training staff often reveals more than just the working ability of the dog. Insights are gained into the satisfaction of the relationship between dog and recipient, and the occurrence of beneficial changes or activities in the owner's life that have arisen as a result of acquiring an assistance dog. These reports strongly suggest that receiving an assistance dog may confer benefits beyond those of increased independence and

mobility. In particular, recipients report increased self-esteem, better social activities and a generalised feeling of enhanced physical well-being. A systematic investigation of these beliefs is a logical step in seeking to understand the nature of these benefits and how these might be incorporated into the tri-partite model of the association between pet ownership and advantages for physical health and psychological well-being.

The obvious place in the tri-partite model for the role of assistance dogs is either as a source of indirect association between pet ownership and health, or as a direct causal route through the perception of the assistance dog as a significant relationship for the owner. In the indirect association model, the dogs would be seen as facilitators of social contact with other people, enhancing a sense of social integration and belonging. This might elevate psychological well-being and increases the number of human contacts in a person's social network which may provide social support and practical help. As has been demonstrated in studies 4 and 5 of this thesis, being accompanied by a dog can increase the number and quality of greetings and transitory social contacts received. The findings have implications for recipients of assistance dogs. Mobility problems arising from physical disability or visual impairment can severely limit the opportunities for social contact with other people, resulting in feelings of isolation or exclusion. In addition there are studies that report that able-bodied people find it difficult to initiate or maintain contact with people who have some form of disability. Whilst this may not be due to prejudice, they appear to feel socially uncomfortable and avoid eye contact or increase social distance. There is evidence that assistance dogs can act as powerful social facilitators and the role of the dog as a social catalyst may be at least as important as the increased mobility and independence afforded by the dog. Studies into the socialising effects of assistance dogs have demonstrated that people in wheelchairs are more frequently smiled at, spoken to and acknowledged when with their dogs. (Eddy, Hart & Boltz, 1988; Mader, Hart & Bergin, 1989). Delafield (1975) also reported a significant increase in

the self esteem of first time guide dog owners, at least partially attributable to the increased number of social interactions they experienced, and the feeling of integration within a community.

The other plausible model is that there may be a *direct causal association* between pet ownership and well-being, arising through the perception of the pet as a significant, supportive relationship in the life of the owner. This relationship may be turned to as a source of comfort and support at times of stress or emotional upset. This rests on the assumption that although person-pet relationships may not be identical to person-person relationships, they do have a great deal in common, particularly as a resource for support. Many pet owners regard their pets as valued members of the family and may seek them out as a source of comfort at times of stress. The relationship can involve confiding and talking to the pet, a feeling of empathy and a sense of loving and being loved which can combat loneliness and depression, particularly in individuals who feel socially isolated. Pets also meet an esteem function in providing a 'need to be needed'. These aspects of pet ownership mirror elements of human relationships that are believed to have important implications for health. For populations at risk of comparative social isolation or with reduced social networks a companion animal may fulfil many of these functions even more than for ordinary pet owners.

10.1.2 Benefits to recipients from the provision of a Dog for the Disabled.

A study was designed to assess the nature and extent of benefits that may accrue to recipients of Dogs for the Disabled. This organisation was selected as it has only recently become established, and recipients are less likely to hold pre-existing ideas or expectations about having a dog than recipients of more well-known, longer-established organisations. The study was facilitated by collaboration with the organisation's senior veterinary advisor.

The study examines reports that recipients of Dogs for the Disabled may benefit from their dog in the following ways.

- a) as a social facilitator, enabling contact with other people;
- b) as an affectionate companionable relationship, extending beyond a working relationship;
- c) as a relationship offering emotional and esteem support (e.g. as a source of comfort, empathy and the sense of being competent and valued);
- d) as a influence on self -perceived physical health.

We also sought information of practical importance to the organisation's management and trainers, for example, recipients' assessments of the dog's reliability in task performance; and whether recipients are likely to want a replacement dog when their present dog was retired.

10.2 Method

A questionnaire was designed to assess beliefs about the four kinds of benefit outlined above. We also included questions on demographic variables (age, gender, people in the household, other pets owned), length of time of having the dog; and whether acquiring the dog was a recipient's own idea or was suggested by another person. The latter was included as we are aware that applicants frequently make preliminary enquiries on the advice of some other person who has become acquainted with the work of Dogs for the Disabled. Whilst this is often a beneficial referral we are also aware that it is possible for people to be persuaded to apply for a dog against their own better judgement, such as when the primary benefit would be independence for the carer rather than for the recipient. This could affect the commitment of the

recipient to establishing and maintaining the working dog relationship, and influence the satisfaction of the working relationship.

As various forms of disability could cause difficulty in completing the questionnaire, subjects were given the choice of a telephone interview, a personal interview or postal questionnaire. The majority (over 80%) elected the postal questionnaire. All questionnaires were anonymous and confidentiality was assured. Completed questionnaires were processed by the author who had no acquaintanceship with any of the subjects.

Responses were obtained from 57 subjects. This represented 90% of the total available recipients of Dogs for the Disabled at the time of the study. Our sample comprised 16 males and 41 females. Their ages ranged from 13 years to 84 years, with a mean age of 42 years. Disabilities included paraplegia and quadriplegia arising from road traffic or industrial injury, cerebral palsy, multiple sclerosis, spina bifida, arthritis, polio, limb amputation and thalidomide injury. Subjects had owned their assistance dogs between three months and seven years, with a mean time of ownership of 2.5 years. A surprising large number of subjects (30%) reported that having a Dog for the Disabled was not their own idea but had been suggested by other people such as doctors, vets, partners and family.

10.3 Results

Subjects were asked to specify what they considered to be the most important tasks their dog performed for them. The majority of subjects (84%) considered retrieving and carrying most important, followed by opening doors (40%), companionship (35%), and barking on command (35%). Only 12% saw their dog important as a guard or deterrent.

When asked what motivated them to apply for a dog, 70% of subjects said they did so in the hope of being more independent. Companionship was specified by 35% of subjects, and 23% hoped to be able to socialise more. No subject saw that their dog might be a means of obtaining or pursuing employment, which is surprising since this is an often expressed goal of assistance dog programmes.

Our main analysis focused on changes that subjects perceived as being brought about through their dog. These were: feelings of social integration; whether subjects had a close, affectionate relationship with their dog which was a source of self-esteem, support and comfort; and improvement in self-perceived health. Analyses of Variance were carried out on questions relating to each of these dimensions and on an aggregate score for each dimension. Factors were age group, gender, length of time owning the dog, and whether getting the dog was their own idea or not. This last factor was included in the analysis because of its potential effect on the satisfaction and/or the relationship with the dog.

10.3.1 Social integration

Ninety two percent of subjects reported that people frequently stopped to talk with them when they were out with their dog, and 75 % reported they had made new friends since they had their dog. Over one third of subjects reported they had an overall better social life.

Analysis of Variance showed a main effect of gender on assessment of a better social life ($F(1,41)=4.485$, $p=0.04$) with males reporting a mean score of 5.147 compared to females, 3.870. Analysis of the aggregate score for social integration revealed no significant effect of age, gender, length of time having the dog or whether it was the subject's own idea to have a dog.

10.3.2 Close affectionate relationship

Ninety three percent of subjects stated that their dog was a valued family member and 72 % felt that the dog was one of their most important relationships; 70% felt their dog was more important as a friend than as a working dog. There was a significant main effect of 'own idea' on questions relating to perception of the dog as an important relationship ($F(1,42) = 7.589, p=0.009$) with people who had been influenced by others to have a dog scoring a mean of 4.717 compared to 6.002 for people whose decision to have a dog was their own. This group of subjects also scored lower on the rating of whether the dog was more important as a friend than a working dog ($F(1,42) = 7.7276, p=0.010$). Subjects owning their dog between 12 and 30 months and for whom the idea was not their own were more likely to state their dog was just a working dog. ($F(3,42)=4.334, p=0.009$).

Analysis of the aggregate score for relationship quality showed a significant main effect of 'own idea' ($F(3,42) = 8.715, p=0.005$). People influenced by others to get a dog had a mean score of 17.37 on this dimension compared to a mean score of 19.55 for people who made the decision themselves.

10.3.3 Dog as a provider of comfort, esteem and support

Seventy percent of subjects said they turned to their dog for comfort if they were sad and 59% told their dog many of their problems and shared most of their feelings with their dog. Male subjects under the age of 45 years especially reported that they shared most of their feelings with their dog ($F(3,42) = 3.043, p=0.039$). Subjects who did not make their own decision to get a dog were less likely to seek comfort from their dog when sad ($F(1,42) = 5.519, p=0.024$). The mean score for this group was 4.569 compared to 5.818 for people who made the decision for themselves.

Analysis of the aggregate score for all questions relating to the dog as a supportive relationship showed no significant effects of age, gender, length of time the dog was owned or whether having the dog was the subjects' own idea.

10.3.4 Enhancement of self-perceived health

Sixty nine percent of subjects reported that they relaxed more since having the dog and over half (51%) thought that they worried less about their health since having a dog. A surprising 47% believed their health had improved since acquiring the dog. There were no significant effects of age, gender, length of time of having the dog or whether the idea to have a dog was the subjects' own. However, people who did not make the decision to have the dog themselves were less likely to strongly disagree with negative statements such as feeling less well since having the dog ($F(1,41) = 8.700, p=0.005$).

10.3.5 Association between social integration, quality of relationship, supportive functions and self-perceived health.

Reports from many of our subjects suggest that an enhanced sense of physical and psychological health may be associated with the role of their dog as a social facilitator, a close affectionate companion and a source of support and comfort. Figure 10.1 illustrates correlations between questionnaire items measuring social facilitation, affectionate relationship, social support and recipients' self-perceived health.

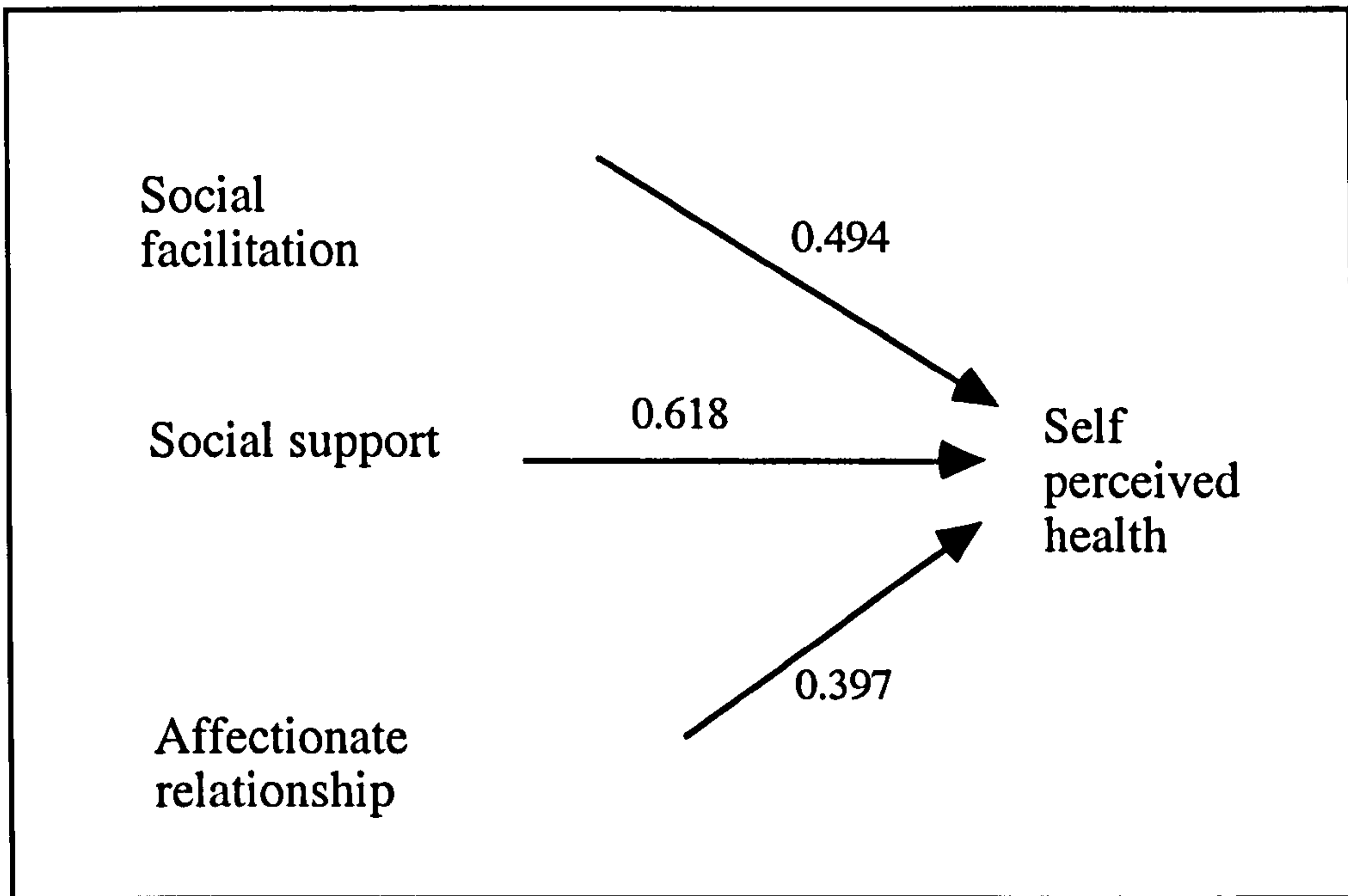


Figure 10.1: Correlations between questionnaire items measuring social facilitation, affectionate relationship, social support and recipients' self-perceived health.

Correlations are significant at $p < 0.05$.

10.3.6 General satisfaction with dog

The questionnaire also included several questions that assessed subjects' general satisfaction with their dogs. Our main finding is that subjects who were influenced by others to get a dog were significantly more likely to wish the dog was more reliable in its work ($F(1,42) = 7.060, p=0.011$) and to agree slightly more with the statement that the dog was more trouble than it was worth ($F(1,42) = 6.420, p=0.015$) than subjects who made the decision to get a dog themselves. Subjects owning their dogs for under 30 months, and who had not made the decision to have the dog themselves, were especially likely to say that the dog had not made such a big difference to their life as they had hoped ($F(3,41) = 3.669, p=0.020$). There was also a significant main effect of age and 'ownidea' for subjects' belief that getting a dog was not the right decision for them, with people for whom it was not their own idea to get a dog being more likely to agree with this statement ($F(1,41) = 7.901, p=0.008$) and people aged between 31 and 45 years also being more likely to agree ($F(3,41) = 3.039, p=0.040$).

10.4 Discussion

Although we found significant differences between people whose decision was their own to have an assistance dog and those who were influenced by other people to have a dog, all such differences were relatively small, differing only in the degree of the agreement to questionnaire statements rather than polarising the two groups of subjects.

The vast majority of subjects reported substantial improvements in social integration regardless of whether having their dog was their own decision or not. Recipients reported that people would stop to chat when they were out with their dogs, and that this form of casual contact was valued as it was in stark contrast to the feelings of avoidance that so many recipients reported as experiencing before they obtained their dog. Not only were there more contacts with other people, recipients reported that the quality of these interactions was different from those experienced when not with their dogs. For example, many recipients spoke of interactions initiated by people as characterised by condescension or pity or being 'talked down to' when not with their dogs. In contrast, having an assistance dog appears not only to increase the likelihood of interactions taking place, but also serve to shift the focus of attention away from the recipients' disability toward their competence in having a highly trained dog.

Most subjects had close, affectionate relationships with their dog that extended beyond a working relationship, many recipients stating that their dog was at least as important as a friend and companion than a working dog. The affection within the recipient-dog relationship bodes well for the continued welfare of the dog, with most recipients showing a vigilance for their dog's health and well-being that was more based on affection than merely a concern to keep the dog fit to work.

In the most affectionate recipient-dog relationships, many recipients appeared to derive social support and comfort from their dog. This was demonstrated by their reports of turning to their dog when upset, sharing their feelings with the dog, and talking over problems or worries.

We were surprised at the number of subjects that reported improvements to health. Since all our subjects had irreversible, often degenerative, medical conditions we had not anticipated that subjects would perceive any improvement. We cannot verify whether there was any true improvement to health but it is likely that enhancements to psychological well-being through increased independence, self-esteem and social integration are reflected in more positive acceptance of a person's own disability. We are currently planning a future study to investigate further these claims for health improvement.

An important issue for Dogs for the Disabled is the welfare of the dogs. We found no evidence that the quality of the person-dog relationship had any implication for the welfare of the dog amongst our current sample. However, we are concerned that agreements to statements such as 'the dog is more trouble than it is worth' and 'the dog has not made such a big difference to my life as I had hoped' were more frequent in the group of subjects for whom the decision to have a dog was not their own.

Although the difference was small, we would recommend that the origin of the decision behind any application for an assistance dog should be investigated, since this may reduce the likelihood of expensively trained dogs being returned to a centre if the recipient is dissatisfied.

Many subjects reported an increase in social activities. In particular subjects enjoyed exercising their dogs. This is clearly beneficial to the owners since they take exercise themselves and have opportunities to meet people. For most dogs such exercise and recreation should also be beneficial. However, we have encountered a small number

of cases where the enthusiasm for this activity has prompted subjects to obtain electric wheelchairs to increase the speed and distance of their travels. This can pose problems for some dogs, especially those which have been deemed as unsuitable for guide dog work because of hip dysplasia problems, and which have been retrained as assistance dogs in the expectation of a less physically demanding working life!

In conclusion our study demonstrates that, for our subjects, having an assistance dog confers benefits beyond those of increased mobility and independence. With due attention to the quality of the recipient-dog relationship and the demands placed on the dog, we would anticipate no major problems to the welfare of the dog. Indeed it is likely that both dog and recipient derive mutual advantages from the relationship.

Chapter 11: Physiological approaches to a direct causal association between pet ownership and health.

11.1 Introduction

This approach addresses the body of research investigating the apparent modifying effects of pets on human physiological responses as demonstrated by reductions in blood pressure and heart rate. The assumption underlying this research is that pets can 'defuse' a stressful situation, producing measurable reductions in physiological responses to stress. This strand of research is included in this section discussing possible mechanisms that exert a direct causal association between pets and health outcome primarily because this is what is claimed by researchers in this area. In fact, the evidence to date is by no means conclusive that the effect is direct and there is a notable absence of adequate explanations to account for results. A primary aim of this discussion is to examine potential explanations for the findings in this area and to assess whether the work into the effects of pets on human physiological responses can sustain claims that this is a direct way in which pets can exert a positive influence on health.

Perhaps the best known research into how pets may influence health is that stemming from the work of Friedmann (1983; 1995.) who reported that the presence of a pet dog could modify stress responses in subjects engaged in a laboratory stress task. This strand of research has resulted in a widespread belief that pets can positively influence health through directly influencing the human physiological responses to stress. Since the majority of studies in this area have not used subjects' own pets, this line of research may be regarded as a non-relationship-focused approach for investigating direct effects of pets on health.

Although many of the studies into the effects of the presence of a companion animal have already been discussed in the introductory chapters, it is useful to summarise here the methodology and the terminology of the experiments as they provide a context for the remaining two empirical studies of the thesis and the questions they address.

11.1.1 Methodology

The methodology employed in the investigation of possible moderating effects of companion animals on cardiovascular responses is broadly similar across the various studies. Using an oscillometric monitor (such as a Dinamap or similar) subjects' blood pressure, heart rate and mean arterial pressure is recorded at regular intervals before, during and after the performance of one or more stress tasks (reading aloud, mental arithmetic, or a physical stressor such as a cold compress). An effective task will produce significant increases in cardiovascular activity. These increases may, such studies claim, be influenced by the presence of a pet animal during the experiment. Thus, studies use at least two conditions; a dog-present condition, and a dog-absent condition. Analyses of between subjects differences and within subject differences are then conducted to test the hypothesis that the presence of a dog/animal can moderate cardiovascular responses to a stress task.

11.1.2 Terminology used in the studies.

In order to adequately explain some of the problems and inconsistencies that can be seen in many of the published studies in this area, it is necessary to fully define some of the terminology used in the studies of research on cardiovascular research.

Base line level is the level of activity recorded when the subject is at rest and cardiovascular output has stabilised. Initial baseline levels would be taken after the subject had been wearing the blood pressure cuff for a period of time and readings

indicated relative stability of these levels. This reading would then be regarded as the 'at rest' level. Periods of rest between successive tasks should normally be comparable to this initial baseline level.

Task level is the level of activity recorded when the subject engages in a stressful task.

Reactivity is the difference between baseline (rest) and task levels.

A reactivity effect is a difference in reactivity due to an experimental intervention (e.g. having a dog present) relative to a control, i.e. a statistical interaction between the condition (intervention vs control) x period (base vs task). To be interpretable as stress reduction, the effect on reactivity should primarily be due to an effect on task levels, as shown illustrated schematically in figure 11.1. A reactivity effect that is primarily due to only differences in baseline levels, as illustrated in figure 11.2, is not readily interpretable in terms of stress reduction since baseline levels are supposed to reflect the absence of stress..

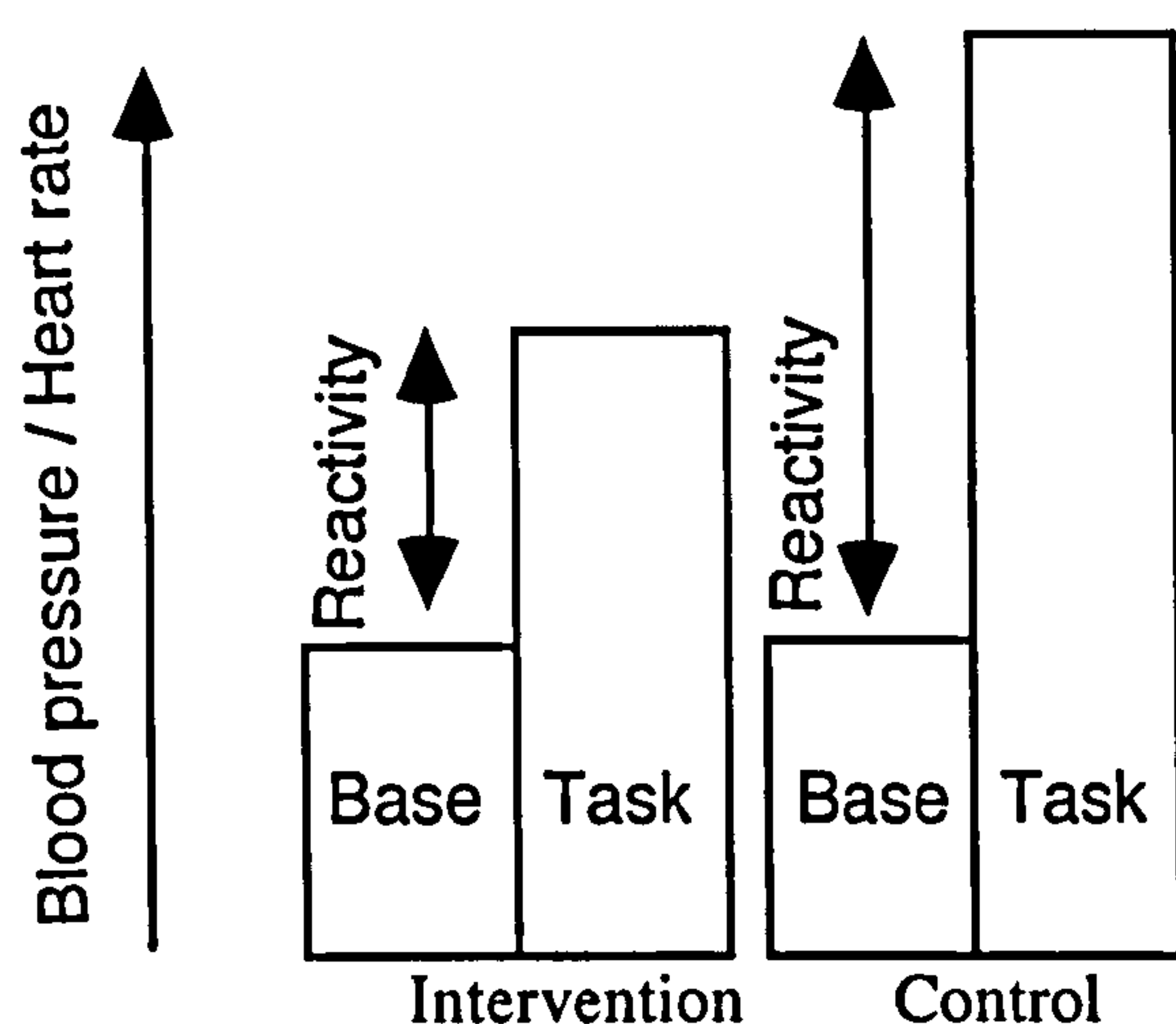


Figure 11.1: A reactivity effect where intervention influences reactivity by influencing task levels but not baseline levels.

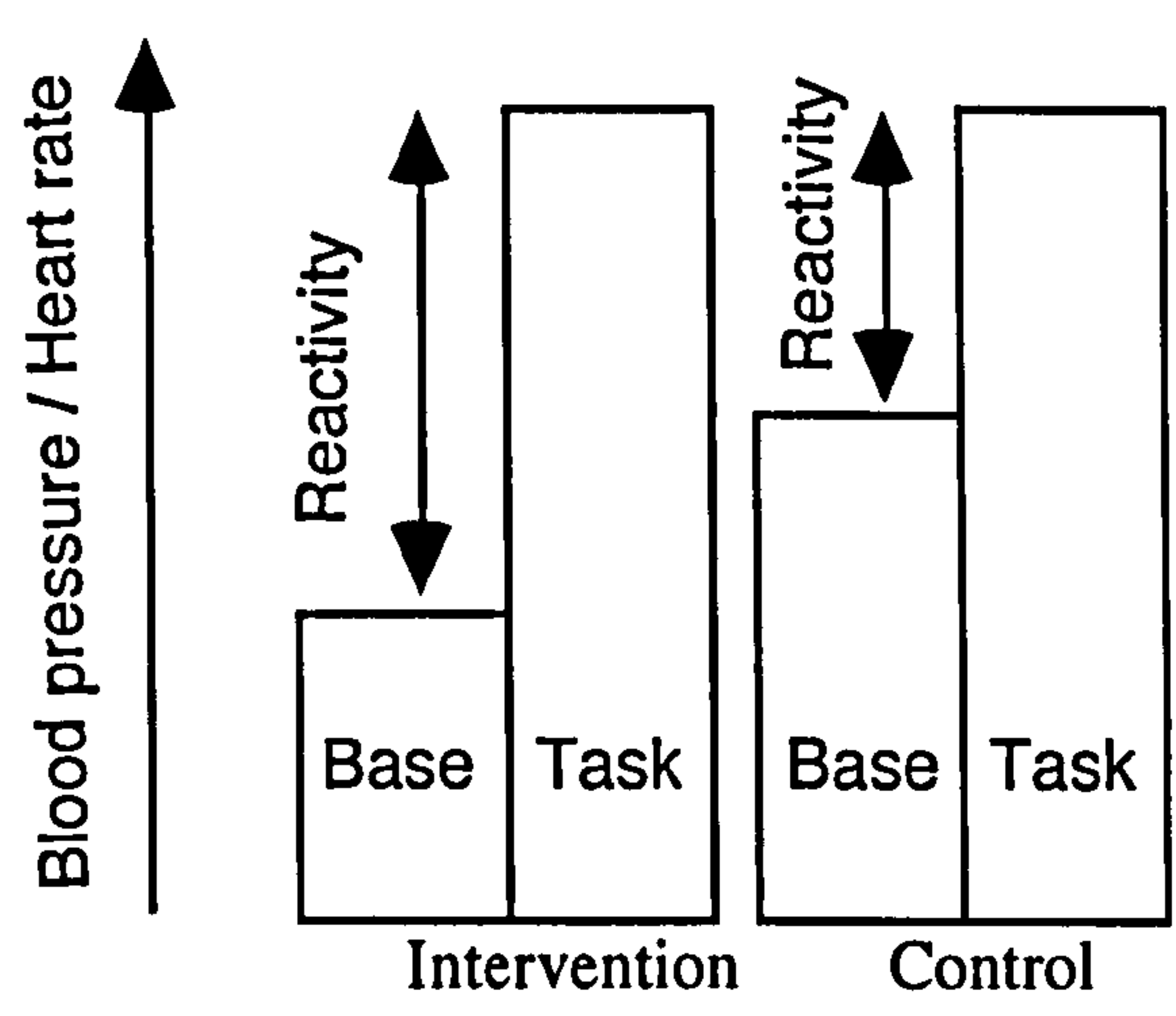


Figure 11.2: A reactivity effect, but the intervention primarily influences baseline levels rather than task levels.

A main effect is an overall reduction in cardiovascular levels between intervention and control conditions across both baseline and task levels. This situation is illustrated schematically in figure 11.3. In the absence of any reactivity effect, this may imply that baseline levels had not stabilised. Alternatively it may indicate that some factor depressed both baseline and task levels but not the reactivity.

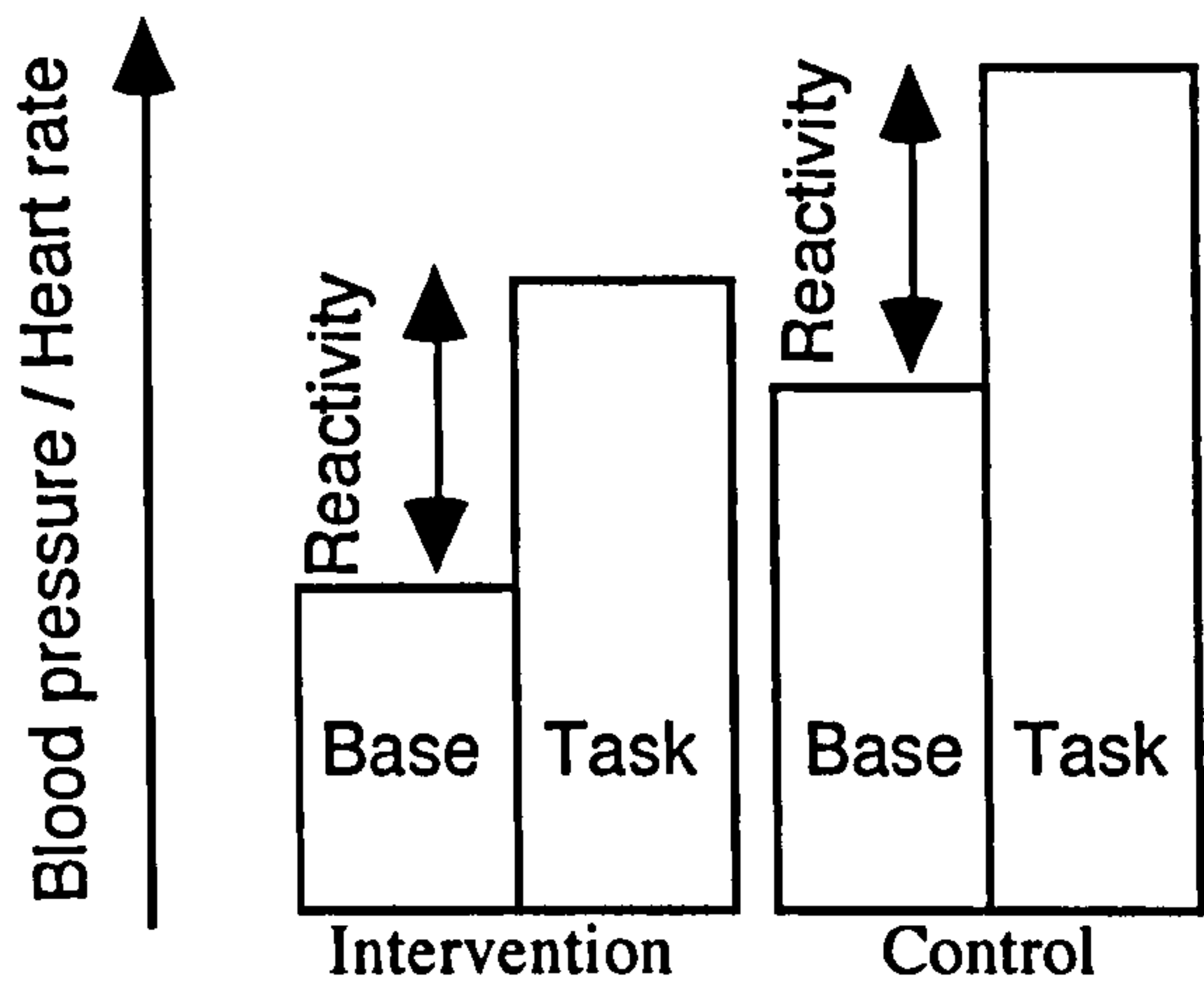


Figure 11.3: A main effect where intervention lowers both baseline levels and task levels, but in this case it does not influence reactivity.

Since the proposed mechanism essential with these studies is that the association between pets and health is via a reduction in physiological arousal in response to stressful events, it would be expected that these studies would demonstrate a reduction in cardiovascular reactivity. However, the evidence for this is mixed. Friedmann et al (1983) found main effects for systolic blood pressure and diastolic blood pressure for the condition when the dog was present, but no reactivity effects. Similarly, Grossberg et al (1985) found no reduction in reactivity, although main effects were not reported. Allen (1991) found a reactivity effect for systolic blood pressure only, this being confined to experiments in subjects' own homes not when in the laboratory. A further study by Locker (1985) failed to produce main effects or reactivity effects.

The lack of consistency and replication of findings is striking. A reduction in reactivity is found in only one experiment and then only for systolic blood pressure. The others report only main effects or no significant effects of any kind. This would hardly merit claims of pets benefiting health by a 'de-arousal' of physiological responses to stress. However, the area has become too established to dismiss lightly and the inconsistencies do raise some interesting questions which may point to possible mechanisms in operation. For example, if only main effects are found, why? Or, if there is a decrease in reactivity, what is the mechanism underlying it, is it the same or different from that underlying studies reporting main effects?

When main effects are reported this would indicate that some factor was influencing the baseline and task levels so that the magnitude of reactivity did not differ significantly between conditions, merely the levels recorded at rest and during the task. Plausible explanations for this may not rest solely on the direct influence of the dog. Consider the possible views of the subjects on entering a laboratory where a dog was present. Could that trigger the sort of social catalysis as described in Section 3 between subject and experimenter? It is feasible that the dog's presence could act as

an 'ice-breaker' encouraging social exchange and conversation and reduce the sense of apprehension experienced by subjects. This could have the effect of reducing baseline and task levels in ways that would not be experienced by subjects in the control condition where the dog was absent and could not, therefore, be available as a catalyst for social interaction. If this were the case, any reported effects would be more explainable in terms of an indirect effect of the dog facilitating interaction than a direct effect via its presence defusing arousal caused by the laboratory stress task.

Alternatively, the presence of a dog in a laboratory may invoke assessments of the lack of importance or seriousness of the experiment as a whole. Since dogs are not customarily encountered in laboratories of this nature, a subject may well conclude that, if a dog is permitted, the experiment is relatively unimportant or not to be taken seriously. Again, this would be far less likely to occur in the control condition where the dog was not present. This could have two implications for results. Firstly, baseline and task levels could be depressed since the subject is less apprehensive at baseline and is less stressed by a perceived trivial experimental task. Secondly, although this may be more of a direct effect since the dog is directly influencing appraisal of a potentially stressful situation, the effect is somewhat unreal since it is likely to be confined to appraisals of laboratory style settings of stressful events. Such an effect would not be expected to generalise to the real world and therefore could not explain health benefits. Similarly, if the work of Lockwood (1983) is supportable, it would suggest that the experimenters appeared more friendly or less threatening in the presence of a dog than when the dog were present. Again, this may be seen as a more direct influence but very context bound.

Where a reactivity effect is found it is important to ascertain what measure contributed to the difference between baseline and task. If it were found to be due to baseline differences only it could be argued that the presence of a dog resulted in a lower baseline due to perceived lack of importance or a catalysis effect but did not

influence the levels recorded for the task performance. This would produce a reduction in reactivity but would not support the claim that a dog's presence reduced the stress experienced during the task.

The current lack of agreement between findings must cast some doubt on claims that pets can influence health via physiological mechanisms. Indeed, there must be some doubt that they exert any influence at all in laboratory stress trials. However, if the claims are to be discarded they must be discarded with good reason. This requires further studies that seek to examine rather more deeply the possible factors that may advance our knowledge of why - or why not- the presence of a pet may influence physiological responses to experimental stress. In this way it may be possible to evaluate the claims made for the 'de-arousal' properties of pets and to provide explanations for the retaining or rejecting of those claims.

The two empirical studies presented in this section attempt to examine the effect of the presence of a dog on the cardiovascular reactivity of subjects engaging in two stress tasks. In both experiments the dog was non-interactive, being trained to lie on a bean-bag in the corner of the laboratory. To control for the possible social catalysis effect of the dog, the experimenters in both studies requested subjects not to engage in conversation and informed subjects that they (the experimenters) would be speaking from only a prepared script. Justification given for these conditions was that it was necessary to reduce the amount of vocalisation due to the sensitivity of the equipment to cardiovascular changes produced by speaking. This was not entirely a ploy to reduce social conversation. The physical effort of motor activity and respiration rates occasioned by speaking aloud do influence cardiovascular readings. Brown, Szabo & Seraganian, (1988) have demonstrated that as much as half of the reactivity produced by a verbal task may be due to the vocalisation involved in executing the task.

This issue also had implications for the tasks used in these studies. The level of cardiovascular reactivity that can be accounted for by the processes of producing speech may indicate that verbal tasks are less desirable for tests of laboratory stress. However, since all other previous studies had used verbal stress tasks such as reading aloud or verbal mental arithmetic, in the interests of being able to compare the results of the two experiments with previous studies it was not considered justifiable to replace these tasks. Instead a second non-verbal mental arithmetic task was implemented to supplement a reading aloud task. It was expected that reading aloud would produce higher reactivity levels than the silent mental arithmetic task.

In the first experiment subjects were requested to complete a questionnaire relating to their perception of the seriousness, importance, and formality of the experiment; their perception of the friendliness or intimidatory manner of the experimenters, and the level of effort they put into performing the tasks to the best of their ability.

The second experiment focused on the subjectively perceived stress experienced during the experiment through use of the State-Trait Anxiety Inventory, and introduced a third condition to the experiment in which background music was played. As music is frequently regarded as a way of inducing relaxation (Robb, 1995) this condition was introduced in order to compare the effects of the presence of a dog.

11.2 Controlling for social catalysis and assessing perceptions of formality/importance (study 10).

11.2.1 Method

Subjects

Forty student subjects (37 undergraduate students and 3 postgraduate students) were recruited for the experiment, all but 2 being from the Department of Psychology at the

University of Warwick. Ages ranged from 18 years to 42 years (mean age 24 years). Thirty subjects were female, 10 were male. All subjects were normotensive (systolic blood pressure <140, diastolic blood pressure <90) and none were taking medication known to affect blood pressure other than the contraceptive pill. Eight subjects rated their health as excellent, 25 subjects as good, 6 as fair and one subject as poor; 87% of the subjects were non smokers. All subjects had attained a pass at GCSE mathematics, a condition imposed to ensure that the maths task to be performed by all subjects would not be seen as unreasonably demanding.

Apparatus

Blood pressure and heart rate were recorded with a Critikon Dinamap Portable Vital Signs Monitor 8100T, an electronic device which automatically inflates an arm cuff at programmed times, and uses the oscillometric method to measure simultaneously systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and heart rate (HR).

The maths task comprised twenty questions selected from a series of 'Readiness for Statistics Tests' derived from "Essentials of Statistics for the Behavioural Sciences" (Gravetter and Wallnau, 1995). The questions were presented automatically at 15 second intervals using a Microsoft Powerpoint programme run on a Phoenix 486 SX25 computer. Subjects were required to write their answers on an answer sheet with numbered spaces corresponding to the questions displayed on the screen.

The reading task consisted of seven paragraphs taken from the initial pages of Chapter 2 of 'East is a Big Bird' (Gladwin, 1970) describing the navigational skills of the Puluwat tribesman. The passage was selected for its rather difficult sentence construction and the presence of unfamiliar tribal names. The length of the passage presented was intentionally more than could be easily read in the time permitted.

The dog used in the experimental condition was a two year old Brittany Spaniel named Branston, owned by a member of the Psychology department. The dog was selected for its docile nature, the ease in which it could be trained to stay unobtrusively on a bean bag in the corner of the room, and because he was of a medium sized, uncommon breed ensuring little chance that subjects would have preconceived expectations of particular behaviours or characteristics as perhaps may occur, for example, with Dobermanns.

Procedure

Two experimenters conducted the procedure. Subjects were recruited to the study and given appointment times at which to attend the laboratory. They were requested to refrain from smoking, alcohol consumption or large meals for three hours prior to the appointment time. Any subjects not keeping appointments were replaced by students found in the departmental common room who were willing to take part at short notice. These replacements were noted to enable analysis to examine any differences between subjects recruited in this way and the subjects given appointments.

Subjects were met at the laboratory by both experimenters and informed that for the purposes of the experiment verbal instructions would be given from a script read by the experimenters and that other conversation was not desirable. The subjects were given a written outline of the experimental procedure, containing information about the sensations they may expect from the blood pressure cuff, and asked if they wished to proceed. If subjects agreed, an experimenter read out a list of health conditions and medications and asked if the subject suffered from any condition or taking any medication mentioned in the list. If the subject indicated he/she did so, they were excluded from the experiment. Two subjects were excluded at this stage; one taking beta blockers for tachycardia and one suffering from Raynaud's Syndrome.

Subjects' upper arms of their non-writing hand were measured and the appropriate sized cuff was selected and fitted. The Dinamap was programmed to take measures of SBP, DBP, MAP and HR at two minute intervals. The subject was told that the period covering the first three measurements was an initial rest period to enable them to accustom themselves to the sensation of the cuff inflating.

The reading task and the maths tasks were counterbalanced for order. At the end of the rest period, subjects were told that their first task (maths or reading) was about to commence and instructions for its completion read from a script. A further three measurements were taken at two minute intervals during the performance of task 1. This was followed by a second rest period with three measurements at two-minute intervals before the commencement of task 2. Three measurements were recorded for the second task. Thus all subjects completed four measurement phases, each comprising three measurements at two minute intervals. Twenty subjects took part in a Rest/Reading/Rest/Maths sequence and twenty subjects in a Rest/Maths/Rest/Reading sequence.

The cuff was then removed and the subjects asked to complete a questionnaire relating to their perception of the seriousness or formality of the experiment, their perception of the friendliness or the intimidatory manner of the experimenters, and the effort they put into performing of the tasks. They were then thanked for their participation and given a debriefing sheet and a health promotion leaflet about blood pressure. This latter was inform and reassure subjects about their own blood pressures, many of whom may not have known what was meant by the readings taken during the experiment, or what constituted normal blood pressure.

Each subject was assigned to one of two experimental conditions, one with the dog present and one with the dog absent. The procedure was the same for both conditions. In the dog present condition, subjects were not introduced to the dog, nor was any explanation for its presence given unless the subject asked, when the experimenters simply said that the dog belonged to a person in the department and asked if the subject minded him being there. One subject stated she disliked dogs but declined the offer to remove him. In all trials in the dog-present condition, the dog was sitting/lying on his bean bag tethered by his leash to a nearby table. He was present in the laboratory before the subjects entered. The dog did not solicit attention from subjects. Owing to his position in relation to the subject entering the laboratory and being asked to be seated at the desk, the subject was unable to make an approach to the dog although he remained in view throughout the experiment.

11.2.2 Results

There were no significant difference between subjects recruited to attend at an appointment time and subjects recruited at short notice to replace subjects not keeping their appointments. Thus subjects were treated as a single sample and a multivariate analysis of variance (MANOVA) was used to examine the influence of various factors on HR, SBP and DBP. This is an appropriate procedure when the dependent variables are part of a system of variables (Huberty & Morris, 1989.). The MANOVA approach also gives some protection against inflation of the Type 1 error rate inherent in multiple univariate tests. Mean arterial pressure was not included in the analysis since it was very nearly a linear function of SBP and DBP. Between-subjects factors were condition (dog / no dog), order of the tasks (math>reading or reading>math) and sex. Within-subjects factors were period (baseline vs task) and task (math vs reading). The outcome of the MANOVA is summarised in Table 11.1 .

Source	Lambda	F(3,30)	P	
Condition (dog vs no-dog)	0.822	2.160	0.113	
Order (of math & reading tasks)	1.000	0.005	1.000	
Sex	0.749	3.360	0.032	*
Condition*Order	0.908	1.009	0.402	
Condition*Sex	0.836	1.967	0.140	
Order*Sex	0.992	0.081	0.970	
Condition*Order*Sex	0.869	1.507	0.233	
Task (math vs reading)	0.515	9.410	<0.0005	**
Task*Condition	0.896	1.158	0.342	
Task*Order	0.803	2.457	0.082	
Task*Sex	0.995	0.052	0.984	
Task*Condition*Order	0.969	0.319	0.812	
Task*Condition*Sex	0.943	0.607	0.615	
Task*Order*Sex	0.953	0.490	0.692	
Task*Condition*Order*Sex	0.861	1.612	0.207	

Table 11.1 : Summary of MANOVA in study 10. Dependent variables were Heart Rate, Systolic blood pressure, and diastolic blood pressure. Between-subjects factors were condition (dog / no dog), order of the tasks (math>reading or reading<math), and sex. Within-subjects factors were period (baseline vs task), and task (math vs reading). (* p<0.05; ** p<0.01)

table continues on next page

Source	Lambda	F(3,30)	P	
Phase (baseline vs task periods)	0.261	28.292	<0.0005	*
Phase*Condition	0.870	1.491	0.237	
Phase*Order	0.958	0.436	0.729	
Phase*Sex	0.812	2.311	0.096	
Phase*Condition*Order	0.960	0.412	0.745	
Phase*Condition*Sex	0.861	1.613	0.207	
Phase*Order*Sex	0.948	0.553	0.650	
Phase*Condition*Order*Sex	0.834	1.989	0.137	
Phase*Task	0.578	7.287	0.001	**
Phase*Task*Condition	0.860	1.633	0.203	
Phase*Task*Order	0.846	1.823	0.164	
Phase*Task*Sex	0.993	0.067	0.977	
Phase*Task*Condition*Order	0.851	1.757	0.177	
Phase*Task*Condition*Sex	0.685	4.599	0.009	**
Phase*Task*Order*Sex	0.901	1.096	0.366	
Phase*Task*Condition*Order*Sex	0.842	1.881	0.154	

Table 11.1 : *continued* Summary of MANOVA in study 10. Dependent variables were Heart Rate, Systolic blood pressure, and diastolic blood pressure. Between-subjects factors were condition (dog / no dog), order of the tasks (math>reading or reading<math>), and sex. Within-subjects factors were period (baseline vs task), and task (math vs reading). (* p<0.05; ** p<0.01)

The main effect of sex showed male subjects to have higher levels of cardiovascular activity overall. The main effect of phase showed that levels of cardiovascular activity were higher during tasks than during baselines, indicating that tasks had an effect of significantly increasing blood pressure and heart rate above non-task levels.

The significant phase x task interaction indicated that the two task types produced differing levels of reactivity (i.e. baseline-task differences) Reactivity was greater for the reading task than for the math task. As noted earlier, verbal tasks have been subject to criticism owing to the higher rates of cardiovascular activity generated by vocalisation required. Indeed, the significant main effect of task indicates that overall cardiovascular activity during the reading task was greater than for the math task. This effect was present only for the task period, not for baselines.

There was no main effect of dog presence on cardiovascular activity. Nor did the presence of the dog have any effect on reactivity - the phase x condition interaction was not significant. Thus the findings do not support earlier work claiming a reduction in cardiovascular activity and/or reactivity in the presence of a passive dog.

The significant phase x task x condition x sex interaction sanctions analysis of the phase x condition interaction separately for each of the four combinations of sex and task. As can be seen in table 11.2, in no case was the interaction significant, confirming that the experiment failed to indicate an influence of the dog on cardiovascular reactivity.

	lambda	F	DF	P	
Females - maths task	0.807	2.074	3,26	0.128	n.s.
Females, reading task	0.773	2.542	3,26	0.078	n.s.
Males math task	0.855	0.338	3,6	0.799	n.s.
males reading task	0.410	2.876	3,6	0.125	n.s.

Table 11.2: Phase (baseline / task) x condition (dog / no dog) interaction in separate MANOVAs for each combination of sex and task.

Analysis of the post-experiment questionnaire indicated that the presence of a dog had no effect on the level of effort subjects applied to the tasks, nor on the number of

correct answers given in the maths task. However, speed of reading the task passage was slower for subjects in the dog present condition than in the dog absent condition (mean number of lines of text completed = 46.55 and 51.4 respectively). When examining dog ownership amongst the subjects, it was found that non-dog owning subjects read significantly slower in the dog present condition (44.9 lines completed) than in the dog absent condition (53.2 lines completed) ($F(1,33)=11.55$, $p<0.01$). This may indicate the dog as acting as a distraction to the task and reducing efficiency. However this slower reading rate did not translate into significantly lower heart rate or reactivity. Similarly, subjects in the dog present condition achieved fewer correct answers for the maths task than the subjects in the dog absent condition (means 59.4 and 44.1 respectively) although this difference was not significant.

With regard to subjects' feelings toward the experiment and the experimenters, there were no significant differences between the conditions as to the level of discomfort felt through the blood pressure cuff; pleasantness or unpleasantness of participating in the experiment or whether subjects felt threatened by the procedures. Rather surprisingly, subjects rated the experimenters more negatively (less friendly/reassuring) in the dog-present condition, $F(1,32)=5.62$, $p=0.024$. This is contrary to claims that the presence of an animal may lead to the conferring of more positive attributes to people or places.

Subjects' perceptions of the formality of the experimental situation were somewhat different in the two conditions. All subjects in the no-dog condition rated the experiment as having some degree of formality whereas 25% of subjects in the dog-present condition rated the experiment as informal, ($\chi^2(5)=10.76$, $p=0.056$). Subjects in the dog present condition also tended to rate the experiment as humorous rather than serious, although this was not a significant difference.

Clearly these subjective aspects warrant further investigation. If the dog's presence simply makes the laboratory setting and the stress task seem less formal or important, the effect is less likely to generalise to stressors outside the laboratory.

11.3 Effect of dog compared to effect of music (study 11)

Although the first experiment failed to show any significant reduction in cardiovascular activity or reactivity when a dog was present during the stress tasks, published accounts have not only reported such reductions but have implied, or been interpreted as showing, that pets may possess special qualities to aid stress reduction. In the absence of adequate comparison conditions, this would appear to be unfounded. For this reason the second study sought to include a comparison condition. In addition to the dog present/dog absent conditions, a third condition was introduced (background music).

Listening to music, as well as being a popularly enjoyed voluntary pastime, has also been shown to be of value as a calming agent in stressful situations. For example, music has been demonstrated to reduce fear and tension during dental treatment (Hanser, Martin, & Bradstreet, 1982) and has been reported as reducing pain experienced by women in childbirth (Hanser, Larson & O'Connell, 1983). The effects of listening to music appear at least as effective as other relaxation techniques such as distraction imagery, and significantly more effective than requesting subjects to merely sit quietly (Avants, Margolin & Salovey, 1990). The type of music presented, or whether it was selected by the experimenter or the subject, appears to be of lesser importance (Thauts & Davis, 1993).

Since listening to music in a laboratory setting is easily performed and requires no movement or activity by subjects, it seems a condition useful to compare with the possible effects of a dog on cardiovascular activity to assess whether the passive presence of a dog is more or less effective as a stress reducing agent.

11.3.1 Method

Subjects

The subjects in the previous experiment were drawn from a student population, predominantly from the Department of Psychology. Since it is possible that the relative youth of the subjects, combined with a familiarity of the psychology laboratories, may have had an influence on their responses to the stress tasks, the second experiment recruited non-student subjects across an older age range.

Eighty subjects were recruited from a subject panel, comprising people who had responded to advertisements for subjects to take part in a range of experiments in the psychology department. Advertisements were placed in internal publications circulated amongst university staff and in local newspapers. Subjects were recruited on an availability basis. The nature of the experiment was known by subjects in advance of them attending. Thirty-five subjects were male, 45 were female. Ages ranged between 25 years and 65+ years.

Procedure

The procedure was the same as for Experiment 9 with the inclusion of the third condition of background music. Physiological readings were as for Experiment 9, being taken at two minute intervals during the initial rest period, task one, rest period two and task two. The reading task was the same passage as presented in Experiment 9. However, the maths task was modified since it would not have been possible to impose a requirement for GSCE/GCE maths on this particular population. The maths task was consisted of a series of addition problems, up to six numbers to be mentally added together, presented at 15 second intervals on a computer screen as in Experiment 9. The reading task and the maths task were counterbalanced for order.

The music selected by the experimenter was a selection of Baroque classics (Rondo Classics, 1995) which was played at low volume. The post-experiment questionnaire consisted of the State Trait Anxiety Index (Spielberger, 1973) and a specially constructed Stress Adjective Checklist (SAC) containing words relating to feelings of anxiety, competence or failure in the tasks.

11.3.2 Results

There were three between-subjects factors in the design: age (4 groups, 25-35;36-45; 46-55; 56+ years), sex, order of tasks (math before reading/ reading before math) and condition (dog present, background music, control with neither dog nor music).

Three-way and four way-interactions among the between-subject factors were not included in the analyses since some cell sizes would have been reduced to below an acceptable minimum. Within-subject factors were task (math versus reading) and phase (baseline period versus task period). All interactions among with-subjects factors were included in the analyses.

As in study 10, the primary analysis was via MANOVA, so that the simultaneous effects of SBP, DBP and heart rate could be investigated. The initial MANOVA, summarised in Table 11.3, revealed the main effect of phase (baseline period versus task period) to be highly significant as expected, indicating that the performance of the tasks exerted a measurable difference from the resting state. However, the condition x phase interaction was not significant, indicating that reactivity to the tasks did not differ according to whether there was a dog present, music playing or neither. The phase factor, however, did show significant interactions with task and the order in which the tasks were presented. There was also a significant main effect of task, and significant task x phase and task x order interactions.

Source	Lambda	F	DF	P	
Sex	0.711	7.195	3, 53	<0.0005	*
Age	0.664	2.627	9, 129	0.008	*
Condition	0.938	0.574	6, 106	0.750	
Order	0.905	1.859	3, 53	0.148	
Sex*Age	0.814	1.264	9, 129	0.263	
Sex*Condition	0.923	0.721	6, 106	0.633	
Sex*Order	0.933	1.272	3, 53	0.294	
Condition*Age	0.735	0.960	18, 150	0.509	
Condition*Order	0.922	0.736	6, 106	0.622	
Order*Age	0.811	1.292	9, 129	0.247	
Task	0.695	7.756	3, 53	<0.0005	*
Task*Sex	0.851	3.096	3, 53	0.035	*
Task*Age	0.822	1.202	9, 129	0.299	
Task*Condition	0.887	1.095	6, 106	0.370	
Task*Order	0.740	6.193	3, 53	0.001	*
Task*Sex*Age	0.879	0.779	9, 129	0.636	
Task*Sex*Condition	0.860	1.379	6, 106	0.230	
Task*Sex*Order	0.947	0.995	3, 53	0.402	
Task*Condition*Age	0.733	0.968	18, 150	0.500	
Task*Condition*Order	0.924	0.714	6, 106	0.639	
Task*Order*Age	0.755	1.757	9, 129	0.083	

Table 11.3: Summary of MANOVA in study 11. Dependent variables were Heart Rate, Systolic blood pressure, and diastolic blood pressure. Between-subjects factors were condition (dog / music / control), order of the tasks (math>reading or reading>math), age (25-35 / 36-45; / 46-55 / 56+) and sex. Within-subjects factors were period (baseline / task), and task (math / reading). (* p<0.05; ** p<0.01) *table continues on next page*

Source	Lambda	F	DF	P	
Phase	0.182	79.277	3, 53	<0.0005	*
Phase*Sex	0.974	0.469	3, 53	0.705	
Phase*Age	0.873	0.825	9, 129	0.594	
Phase*Condition	0.885	1.110	6, 106	0.361	
Phase*Order	0.942	1.093	3, 53	0.360	
Phase*Sex*Age	0.885	0.741	9, 129	0.671	
Phase*Sex*Condition	0.911	0.841	6, 106	0.541	
Phase*Sex*Order	0.957	0.798	3, 53	0.500	
Phase*Condition*Age	0.773	0.797	18, 150	0.702	
Phase*Condition*Order	0.915	0.798	6, 106	0.574	
Phase*Order*Age	0.832	1.128	9, 129	0.348	
Task*Phase	0.691	7.912	3, 53	<0.0005	*
Task*Phase*Sex	0.885	2.296	3, 53	0.088	
Task*Phase*Age	0.831	1.133	9, 129	0.344	
Task*Phase*Condition	0.960	0.366	6, 106	0.899	
Task*Phase*Order	0.777	5.059	3, 53	0.004	*
Task*Phase*Sex*Age	0.875	0.807	9, 129	0.611	
Task*Phase*Sex*Condition	0.915	0.804	6, 106	0.569	
Task*Phase*Sex*Order	0.963	0.670	3, 53	0.574	
Task*Phase*Condition*Age	0.796	0.702	18, 150	0.806	
Task*Phase*Condition*Order	0.948	0.475	6, 106	0.825	
Task*Phase*Order*Age	0.814	1.263	9, 129	0.263	

Table 11.3 *continued from previous page*:: Summary of MANOVA in study 11. Dependent variables were Heart Rate, Systolic blood pressure, and diastolic blood pressure. Between-subjects factors were condition (dog / music / control), order of the tasks (math>reading or reading>math), age (25-35 / 36-45; / 46-55 / 56+) and sex. Within-subjects factors were period (baseline / task), and task (math / reading). (* p<0.05; ** p<0.01)

There were significant main effects of age and sex but the lack of age x phase and sex x phase interactions indicate that these differences related to levels of cardiovascular activity rather than reactivity. Finally, there was a significant sex x task interaction, indicating that sex differences varied between the reading task and the math task. Univariate analyses revealed that the main effect of age was confined to systolic blood pressure, and pairwise comparisons indicated that it was confined to the contrast between youngest subjects (25-35 years) and oldest subjects (56+ years) (Tukey HSD test, $p < 0.05$). The systolic blood pressure of the 65+ age group was, on average, 19mm Hg higher than that of the 25-35 group. Sex differences were apparent in both systolic and diastolic blood pressure with males having higher readings than females. These differences were 11mm Hg for systolic blood pressure in the math task, 13 mm Hg for systolic blood pressure in the reading task, 9mm Hg for diastolic blood pressure in the math task and 10mm Hg in the reading task. Each of these sex differences were significant at $p < 0.002$ (Turkey's HSD tests). These findings, although not of central importance to the experiment, do provide evidence that the experiment was sensitive enough to detect well known trends and differences in blood pressure with regard to age and sex.

To further investigate the complex interactions involving task, phase and order, four separate MANOVAs were run, one for each combination of order and task. Since there were no interactions among the between-subjects factors, and some of the cell sizes for combinations of these factors were very small, these interactions were not included in these analyses. The four MANOVAs are summarised in Table 11.4

Math task (before reading)	Lambda	F	DF	P	Univariate follow-up of significant effects
Phase	0.155	54.47	3, 30	<0.0005	SBP F(1,32)= 50.39, p<0.001 DBP F(1,32)= 57.51, p<0.001 HR F(1,32)=106.19, p<0.001
Sex	0.872	1.47	3, 30	0.243	-
Age	0.541	2.34	9, 73	0.022	SBP F(3,32)= 3.10, p=0.041 DBP F(3,32)= 0.10, n.s. HR F(3,32)= 0.60, n.s.
Condition	0.874	0.70	6, 60	0.651	
Sex*Phase	0.921	0.86	3, 30	0.473	-
Age*Phase	0.679	1.40	9, 73	0.204	-
Condition*Phase	0.714	1.84	6, 60	0.107	-
Math task (after reading)	Lambda	F	DF	P	Univariate follow-up of significant effects
Phase	0.275	28.12	3, 32	<0.0005	SBP F(1,34)= 56.46, p<0.001 DBP F(1,34)= 23.63, p<0.001 HR F(1,34)= 67.96, p<0.001
Sex	0.549	8.75	3, 32	<0.0005	SBP F(1,34)= 8.49, p=0.006 DBP F(1,34)=15.28, p<0.001 HR F(1,34)= 0.9718, n.s.
Age	0.544	2.47	9, 78	0.016	SBP F(3,34)= 3.21, p=0.035 DBP F(3,34)= 3.18, p=0.036 HR F(1,34)= 1.66, n.s.
Condition	0.818	1.13	6, 64	0.356	-
Sex*Phase	0.925	0.87	3, 32	0.469	-
Age*Phase	0.692	1.42	9, 78	0.196	-
Condition*Phase	0.859	0.85	6, 64	0.540	-

Table 11.4: Summary of separate MANOVAs for each combination of task and order. Dependent variables were Heart Rate (HR), Systolic blood pressure (SBP), and diastolic blood pressure (DBP). Between-subjects factors were condition (dog / music / control), age (25-35 / 36-45; / 46-55 / 56+) and sex. Phase (baseline / task), and task (math / reading) was a within-subjects factor. (* p<0.05; ** p<0.01)

table continues on next page

Reading task (before math)	Lambda	F	DF	P	Univariate follow-up of significant effects
Phase	0.218	38.30	3, 32	<0.0005	SBP F(1,34)= 75.75, p<0.001 DBP F(1,34)=112.90, p<0.001 HR F(1,34)= 64.53, p<0.001
Sex	0.536	9.24	3, 32	<0.0005	SBP F(1,34)= 8.84, p=0.005 DBP F(1,34)= 18.28, p<0.001 HR F(1,34)= 0.85, n.s.
Age	0.610	1.96	9, 78	0.056	-
Condition	0.909	0.52	6, 64	0.789	-
Sex*Phase	0.992	0.08	3, 32	0.970	-
Age*Phase	0.748	1.10	9, 78	0.373	-
Condition*Phase	0.890	0.64	6, 64	0.697	-
Reading task (after math)	Lambda	F	DF	P	Univariate follow-up of significant effects
Phase	0.167	49.95	3, 30	<0.0005	SBP F(1,32)= 74.67, p<0.001 DBP F(1,32)= 94.33, p<0.001 HR F(1,32)=106.26, p>0.001
Sex	0.816	2.26	3, 30	0.102	-
Age	0.657	1.53	9, 73	0.153	-
Condition	0.861	0.77	6, 60	0.593	-
Sex*Phase	0.902	1.09	3, 30	0.368	-
Age*Phase	0.741	1.07	9, 73	0.399	-
Condition*Phase	0.732	1.69	6, 60	0.139	-

Table 11.4 *continued from previous page*: Summary of separate MANOVAs for each combination of task and order. Dependent variables were Heart Rate (HR), Systolic blood pressure (SBP), and diastolic blood pressure (DBP) Between-subjects factors were condition (dog / music / control), age (25-35 / 36-45; / 46-55 / 56+) and sex. Phase (baseline / task), and task (math / reading) was a within-subjects factor.

The phase effect was significant in all four task-order combinations. Univariate tests showed that all three cardiovascular variables changed between baseline phase and task phase. These findings are illustrated in Figure 11.4 There were no significant interactions between phase and any of the between-subject variables of age, sex or condition.

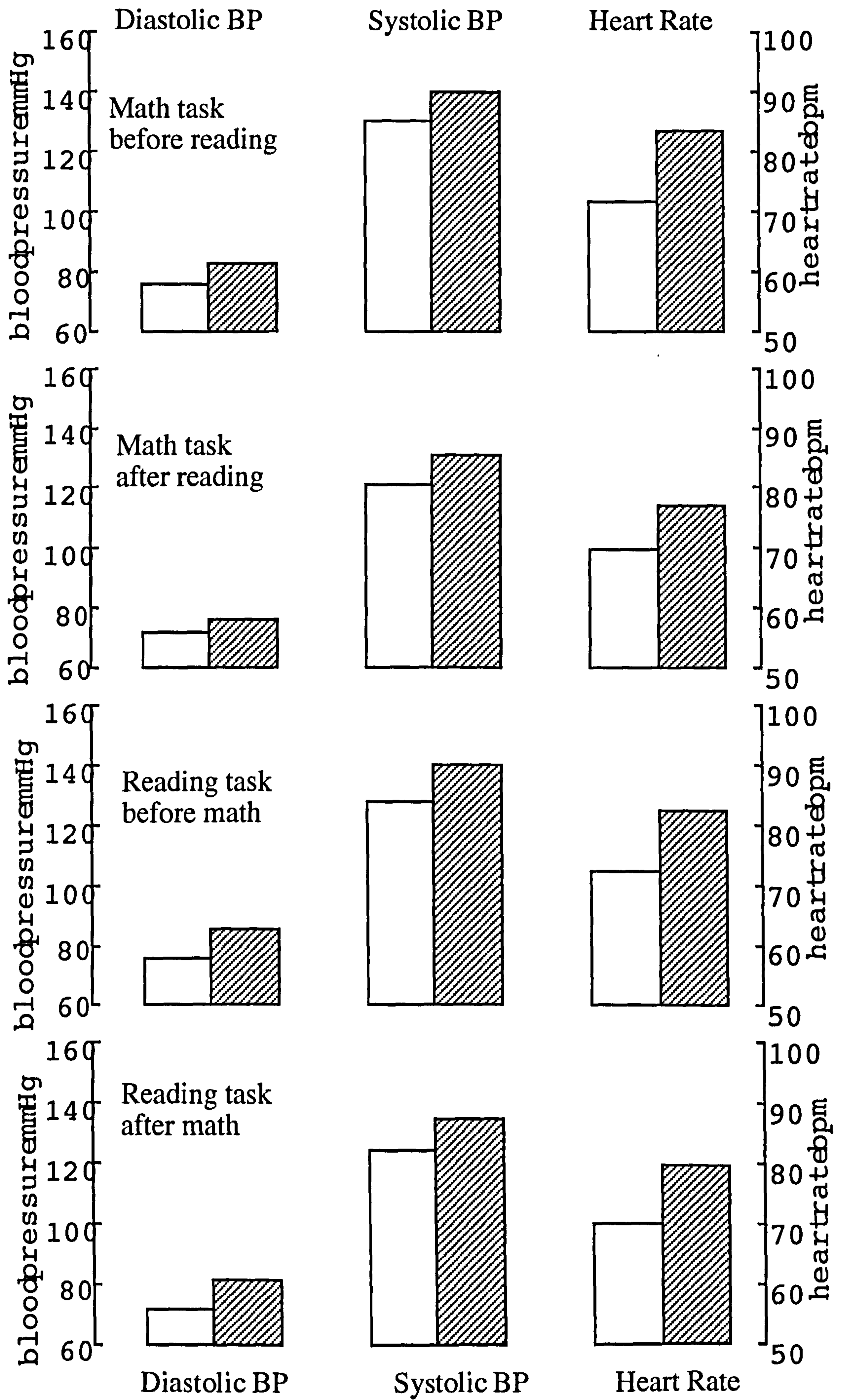


Figure 11.4: *on previous page* Mean levels of cardiovascular variables during baseline periods (open bars) and task periods (hatched bars) for each task in each order of testing.

There were significant main effects of age in both analyses involving the math task but in neither analysis involving the reading task. However, the lack of a significant age x task interaction in the primary analysis indicates that any interpretation of age effects on differences between the tasks should be treated with caution. Moreover, these effects concern cardiovascular activity rather than reactivity in the sense of responsivity to the task.

There were significant main effects of sex in both tasks when they were presented in the order of reading followed by math, but not when presented in the reverse order.

In summary, the analyses as a whole indicate that reactivity levels to stress tasks do not differ significantly between conditions, with neither the dog present condition nor the music condition exerting any modifying influence upon objectively measured indices of stress response.

The post-experiment questionnaires were intended to assess subjective feelings of anxiety generated by the performance of the stress tasks. The State Trait Anxiety Index has been widely used to examine pervading (trait) anxiety levels versus anxiety levels generated by a stressful situation (state). Subjects scores were calculated in accordance with the instructions laid out for use of the Index.

The Stress Adjective Checklist contained 40 adjectives to describe feelings that subjects might apply to the experience of performing the stress tasks. These were divided into 20 positive items relating to feelings of competence and absence of anxiety and 20 items relating to feelings of failure and presence of anxiety. All were

rated on a scale of 1 (does not describe my feelings at all) to 5 (describes my feelings extremely well). Scores for positive items were reversed to give a high overall score as indicating negative feelings and presence of anxiety.

A Principle Components Analysis on the 40-item checklist revealed that the majority of items loaded on to three components corresponding to feelings of failure and inadequacy (component 1), feelings of achievement and competence (component 2) and feelings relating to the presence or absence of threat and anxiety (component 3). Items with loadings of greater than 0.5 were identified and the scores for these added to give each subject a score for each component. The items contributing to each component are listed in the table 11.5, together with the Cronbach's alpha coefficient for each list.

Component 1	Component 2	Component 3
(failure./inadequacy)	(achievement / competence)	(threat/anxiety)
despondent	enthusiastic	unaffected
disoriented	pleased	alarmed
incompetent	exhilarated	calm
demoralised	determined	unruffled
dejected	excited	threatened
failing	satisfied	relaxed
unfocused	enjoyment	
inept	meticulous	
inadequate	effortful	
	achieving	
Alpha=0.90	Alpha = 0.85	Alpha =0.83

Table 11.5: Items from the Stress Adjective Checklist

To assess whether subjects' scores on the State Trait Anxiety Index and the Stress Adjective Checklist were related to their levels of cardiovascular reactivity, scores for trait anxiety, state anxiety and for each of the components of the Stress Adjective Checklist were correlated with the reactivity level recorded for systolic and diastolic blood pressure, and heart rate for each of the two tasks. The correlations are shown in Table 11.6.

Subject's ratings of anxiety experienced during the tasks, or their assessment of how well or poorly they performed the tasks, did not correlate with their levels of reactivity during the tasks, indicating that subjective measures of anxiety or stress were not reflected in the objective measures.

Component 1 and component 3 of the Stress Adjective Checklist were significantly correlated with each other and with state anxiety. This was unsurprising since each captured negative affect and anxiety as generated by the tasks. Component 2, comprising feelings of competence and achievement was not significantly correlated with either of the two other components nor with state or trait anxiety. Somewhat surprisingly, state anxiety was significantly correlated with trait anxiety. Despite claims made of this instrument that it can successfully separate out trait and state anxiety, its failure to do so is not uncommon. That the two components of the Stress Adjective Checklist which comprise items of feelings of failure and presence/absence of threat and anxiety correlate significantly with the state anxiety scores but not with trait anxiety may indicate that they better capture state-like feelings than does the state anxiety.

stress adjective checklist			State-trait anxiety			math task reactivity			reading task reactivity		
	inadequacy/ failure	achievement/ competence	anxiety threat/	state anxiety	trait anxiety	Heart rate	Systolic BP	diastolic BP	Heart rate	Systolic BP	diastolic BP
inadequacy	1.000										
achievement	0.202	1.000									
threat	0.372 **	0.182	1.000								
state anxiety	0.289 *	0.202	0.545 **	1.000							
trait anxiety	0.175	-0.026	0.204	0.486 **	1.000						
Heart rate	0.120	-0.064	-0.156	-0.177	0.042	1.000					
systolic BP	-0.075	-0.091	-0.025	-0.153	0.091	0.320 *	1.000				
diastolic BP	-0.028	-0.246	-0.119	-0.151	-0.079	0.282 *	0.340 **	1.000			
Heart rate	0.152	0.006	0.018	0.052	0.224	0.423 **	0.076	0.226	1.000		
systolic BP	-0.152	-0.110	-0.024	-0.097	0.180	0.101	0.341 **	0.056	0.285	1.000	
diastolic BP	0.128	-0.054	0.089	-0.024	0.201	0.273 *	0.217	0.294	0.440 *	0.559 *	1.000

Table 11.6: Correlations among adjective checklist component, state and trait anxiety, and reactivity measurements in the two tasks. Reactivity is the difference between task and baseline levels. * $p < 0.05$, ** $p < 0.01$.

To determine whether subjective assessments of anxiety were influenced by the experimental conditions, i.e. whether subjects in either the dog present condition or the music condition felt themselves to be less anxious than subjects in the control condition, a MANOVA was conducted. Between-subjects factors and within-subjects factors were the same as for the initial analysis. The dependent variables were the three component scores of the Stress Adjective Checklist and the scores for State Anxiety and Trait Anxiety. The MANOVA revealed no significant effects of any kind, indicating that subjective assessments of stress or anxiety were not influenced by the experimental conditions. Thus even if subjects thought themselves to be more relaxed by either the music or the dog, this was not translated into objective measures of HR, SBP or DBP.

11.3.3 Discussion

The two experiments described in this section sought to further investigate the reported claim that the presence of a pet can moderate stress responses. Refinements to the methodologies used in earlier studies were the scripted dialogue adopted by the experimenters to avoid any effect of social catalysis that may be generated by the presence of the dog (and which would not, therefore, exist in the no-dog conditions), and the subjective assessment of the experimental conditions, and/or the effort/performance applied to the tasks. In the second experiment background music was used as a comparison condition to the dog-present condition.

The tasks significantly effected reactivity (baseline to task measurements) but in neither experiment was this moderated by the presence of the dog as indicated by lack of significant task x condition interactions. The absence of significant main effects of condition for any of the cardiovascular variables suggests that having a dog present did not influence the subjects' perceptions of stress during the experiment, nor did it produce significantly lower levels of cardiovascular activity during rest periods.

In view of the very mixed findings from earlier studies, this is perhaps not so surprising although it might have been expected that the presence of a dog would, as Friedmann has suggested, act as a 'defuser' of stress through making the experiment appear less formal or threatening. However, Friedmann's suggestion is not the only interpretation that could be placed on any such finding. As stated earlier, the presence of a dog could be seen as indicating that the experiment is less important or serious if a dog were permitted in the laboratory.

Although no such effects on cardiovascular activity were found in either study to support these suggestions, both studies made use of post-experiment questionnaires to assess subjects' perceptions of the experiment, the experimenters, and the level of effort applied to the tasks. In neither experiment did the presence of a dog have any effect on the effort applied to the tasks, as reported by the subjects, nor did it significantly effect the accuracy of the tasks performed. However, in study 10 the reading task was significantly slower in the dog present condition suggesting that the dog may have been a distraction to the task rather than a distraction to the anxiety of the task as Friedmann suggests. The number of correct answers achieved in the maths task was also lower in the dog present condition although this was not significant.

It would also seem that subjects' perceptions of the experimental conditions and of the experimenters were not influenced by the presence of a dog with the exception of formality/informality of the experiment and whether the experiment was viewed as serious or humorous. Subjects in the dog present conditions were more likely to report that the experiment was informal and/or humorous than subjects in the no-dog conditions. Somewhat surprisingly, in study 10, subjects in the dog condition rated the experimenters as less friendly than in the those in the no-dog conditions. This is contrary to Lockwood's (1985) suggestion that the presence of an animal may make people or places appear more positive or reassuring. This finding may be attributable to the scripted dialogue of experimenters seeming to be incongruent with any

informality that the dog's presence may have aroused. Further experiments are currently being conducted to investigate whether a scripted dialogue or the permitting of free conversation has any effect on either subjects' cardiovascular activity or their perceptions of the experiment.

The comparison condition of background music employed in study 11 also produced no significant effects in cardiovascular activity, reactivity or on subjects' perceptions of anxiety generated by the experiment. This should not be taken as meaning that a dog is as effective as music in aiding subjects' coping with a stress task. Rather it indicates that music has as *little* effect as the presence of a dog. Subjects' reported that the music was distracting when performing both the reading task and the maths task, although the scores on each were similar across conditions. As with the dog condition, music did not appear to help relaxation during rest periods. It may be that for tasks requiring some measure of concentration neither a dog nor music has any beneficial effect in lowering stress and, indeed, may have a detrimental effect on performance.

In conclusion, the two experiments did not find evidence to support the assertion that the presence of an animal can reduce stress responses either in terms of reactivity to a stressor, or through the appraisal of an event as less stressful. Combined with the inconsistent findings from earlier studies, these two experiments further illustrate the difficulties in substantiating any claim for stress reduction from the presence of a companion animal. This cannot be easily dismissed by explanations such as small samples or the use of young, normotensive subjects since both studies investigated a substantial number of subjects and, in study 11, a variety of ages were recruited. The lack of consistent results across the studies in this area must surely cast doubt on the robustness of the evidence available to support claims for stress reduction from companion animals.

11.4 Social support and physiological reactivity

Although relationship functions and physiological responses have been discussed separately, this has been primarily a reflection of the trends of recent research. The two are not truly separable since a wide range of psychological processes are now known to influence physiological processes. For example, cognitive appraisal of a potential stressor may include reviewing intrapersonal and interpersonal resources available to meet a perceived demand. If these are perceived to be available and adequate, arousal responses to a stressor may be significantly reduced even if these resources are not directly mobilised. Perceived adequacy of coping strategies or belief in one's control of a situation may also reduce physiological arousal irrespective of whether these are valid perceptions. Personality characteristics which influence pervading cognitive styles, such as hardiness and optimism, also exert beneficial influence on the levels of arousal to stressful events (Wiebe, Sanford, Reese & Walker, 1992).

Recently, a strand of research has attempted to investigate the influence of social support on physiological arousal. The methodologies employed in such research have strong similarities to the earlier work on cardiovascular reactivity. A subject is exposed to a laboratory stress task and blood pressure and heart rate are monitored continuously via equipment similar to the Dinamap described earlier. However, in the experimental trials the subject is provided with a source of support during the task, in the form of a friend or colleague. The hypothesis underlying such work is that perceptions of available support will reduce cardiovascular reactivity to the task.

A number of recent studies outside the field of companion animal studies have attempted to examine the effects on cardiovascular arousal of having a companion present during a stress task. Karmack, Manuck and Jennings (1990) found that subjects who were accompanied by a friend during a stress task had lower levels of

systolic blood pressure and heart rate than subjects tested alone, even though the friend was silent throughout the experiment and wore headphones so that they could not hear the subject's responses to the task. Similar findings were also reported by Edens, Larkin and Abel (1992). These two early experiments gave encouragement to the view that the perception of available support may, indeed, ameliorate stress responses. However, it remained unclear what the nature of the support might be since the friends who accompanied subjects during the tasks were unaware of the subjects' performance and could not offer help other than give a light touch to the wrist. Nor is it reported whether the subjects themselves perceived any support as being available or received from their friend.

Implicit in these findings is that a friend may constitute perceived support provision or availability even though they did not actually provide any, nor did the subject attempt to mobilise any support. Since this may be due to the assumptions that one has about one's friends' willingness or ability to be supportive, subsequent studies attempted to test whether a friend may be more successful in alleviating stress under such conditions than a stranger, and whether active support may be more effective than passive presence.

Gerin, Pieper, Levy and Pickering (1992) provided subjects with either a supportive stranger who gave verbal support to a subject during a task involving arguing a case with two opposing confederates, or a neutral stranger who remained silent or gave only neutral comments (although not unsupportive) during the discussion. It was found that active support was associated with significantly lower levels in systolic blood pressure, diastolic blood pressure and heart rate for subjects in that condition. Similar findings were reported by Lepore, Allen and Evans (1993) and Lepore (1995) when a comparison was made of a supportive stranger and no companion during a public speaking task. Thus it would appear that active support can ameliorate stress

responses even though there is no friendship or relationship between the subject and his/her companion.

Comparisons between the effect of a friend and a stranger have had more mixed results, especially when no active support has been apparent. Snyder and Monson (1975) and Cacioppo (1992) and Sheffield and Carroll (1996) failed to find any differences in cardiovascular responses to stress tasks between conditions which included a stranger and conditions which included a friend if they were merely present, even though they were able to hear and observe the subjects' performances on the tasks. Indeed, silent/passive support from friends (i.e. simply being present) appears only to reduce stress responses if the threat is perceived as high (Kamarck, Annunziato & Amateau, 1995; Gerin, Milner, Chawla, & Pickering, 1995).

To date, the findings of these studies remain rather uncertain. Active support appears to exert a beneficial influence but it need not be provided from a friend. Nor does the presence of a friend necessarily afford similar or additional reductions in cardiovascular responses if they are not able to offer active support . However, there is some limited evidence from earlier studies that the presence of a friend may exert some modifying influence, although later studies tend not to support this finding. Although the findings are mixed, it is clear that some effect can be exerted by the presence and/or active support of a companion present during a stress task.

Against the background of this recent research, Allen et al has conducted studies to examine whether social support may be the mechanism underlying the reported reduction in cardiovascular arousal during stress tasks when accompanied by a pet. Allen, Blascovich, Tomaka and Kelsey (1991) tested 45 female subjects during the performance of a mental arithmetic task. The task was first conducted alone in a laboratory to assess reactivity levels aroused by the task. Subjects were then tested two weeks later in their own homes under one of three conditions a) with only the

experimenter present; b) with their own pet dog present; and c) with a close human friend present. The human friends were instructed to be supportive, although it is reported that none gave verbal support, confining their behaviour to eye contact and leaning forward toward the subject.

It was found that subjects in the friend-present condition exhibited 'extremely high' physiological reactivity to the task in comparison to the control (experimenter only present) condition where reactivity was 'moderate' whilst subjects in the dog present condition exhibited 'extremely low' reactivity. (Words in quotation marks denote Karen Allen's own summary by personal communication). Furthermore, performance was most accurate for subjects in the dog condition.

A second study (as yet unpublished) focused on 240 married couples who were tested under one of four conditions: a) alone (with just the experimenter present); b) with their spouse; c) with a same-sex friend; and d) with their own dog. The stress tasks were a mental arithmetic task, a speaking aloud task, and immersing a hand in cold water (cold pressor task). The findings are reported to closely parallel those of the first study. Reactivity was lowest in the dog condition but highest in the spouse condition.

The results of both studies have been interpreted in terms of the provision of social support. However, this is incongruous with the more conventional findings in support research where friends, partners and close human relationships are widely found to provide *more* support at times of need, resulting in *more* stress reduction rather than less, as was found in these studies. Perhaps to aid an interpretation that permitted the finding to be couched in terms of social support, the notion of 'evaluateness' of the person/animal present was introduced. Thus friends or partners were perceived as being evaluative, and thus possibly posing additional stress, whereas the dog was not. Whilst this may be true, it is difficult to reconcile with more mainstream findings of

the supportive nature of friends and partners. Nor is any explanation offered for why evaluation may be applicable to these stress tasks but apparently not in 'real-life' stresses where friends and partners are turned to for support.

One possible explanation is that such stress tasks are not perceived as stressful in the emotional sense, even though they may elicit physiological reactivity. If they were merely perceived as a 'test' where poor performance may produce embarrassment in front of others whom the subject thought important to them, evaluation may well be an important feature. However, this would remove the interpretation from the use of social support which is acknowledged to be the receipt of resources to aid the coping with a perceived stressor. The studies do not give details of the type of support assumed to be given (or not given), nor do they state whether the subjects felt themselves to be receiving support.

Although the research is to be welcomed in that it provides valuable links between the study of physiological responses to stress and psychological processes that may influence those responses, it is somewhat incongruous with the huge body of research into supportive relationships in real-life stresses. It is arguable whether the explanation for the reductions reported may be truly attributable to the provision of social support, either because the tasks are too removed from real stressful life events, or because they rely on social comparison rather than the perception of available support.

The research is as yet in its early stages but already a number of questions have arisen. Perhaps the most problematic is that although these studies make often extensive reference to the considerable influence that may be exerted by social support in ameliorating stress, it has yet to be established that providing the presence of a friend, a dog or a colleague in an experimental situation actually constitutes the provision of support within the conventional usage of support. Most studies of

support outside the laboratory have concentrated on the roles and functions provided by relationships that may alleviate the stress responses to coping with real problems. Emotional support and esteem support from close, trusted relationships which act as confidants figure prominently in these studies. Recovery from illness (Glass et al, 1993), adjustment to losses such as bereavement or unemployment (Littlewood, 1992; Warr, 1987) have all highlighted the beneficial effects of emotional support from close human relationships. Indeed, adequate emotional support has been cited as being the primary indicator of a favourable prognosis for recovery of major illness such as stroke and myocardial infarct (Glass et al, 1993; Berkman & Symes, 1979)

Moreover, support is rarely a 'one off' occurrence. It more resembles a process whereby a problem is perceived and this mobilises a sequence of support seeking. The support sought may differ qualitatively as well as quantitatively in the course of dealing with a problem. Cutrona and Russell (1990) have investigated this sequence and the matching of the type of support to a type of need to need in her model of 'optimal matching'. The provision of support should, she argues, 'fit' the type of need demanded by the stressor. For example, adjustment to bereavement or loss may benefit from emotional support in the earlier stages of adjustment, as does adjustment to the diagnosis of severe illness such as cancer (Wortman, 1984) since the primary need for support is to facilitate the coping with the emotional shock of such stressors. At later stages esteem support may be of most value as the person requires assurance in their competence to deal with the situation. Practical or instrumental help may then be mobilised to operationalise behaviours designed to adjust to the situation in practical ways. Cutrona has argued that it is not only the absence of support that may elevate difficulties in coping with stressful situations. Inappropriate support i.e. a form of support which, although present, does not match the need may be as least as damaging as no support. It is whether the receiver perceives the support as helpful and desirable that is critical. An example derived from current research into support received by people who have recently experienced a spousal bereavement illustrates

this. One subject expressed gratitude at the way his sister had helped him emotionally through the first weeks after his wife had died by spending time with him, allowing him to talk of his wife, cry when he needed to, with no show of embarrassment by either party. This, he stated, was exactly what he needed, an understanding sympathetic person who permitted his emotional expression of his grief. However, the same subject was deeply upset at the support offered by his daughter who concentrated on the practical side of dealing with the death. Her rapid clearing of her mother's wardrobe he considered premature and later regretted not being able to decide what items of his late wife's belongings he would like to keep. The daughter also presented her father with a book entitled 'Cooking for one', which he found devastating in that it highlighted his loss. It should be emphasised that there is no reason to believe that the daughter believed she was being anything other than helpful and supportive, but her misjudgement in what her father needed at that time resulted in increased distress and hurt. In this instance, the daughter's actions were regarded as 'doing the worst possible thing out of the best possible motives'.

Few major stressors do not have an emotional component, and it is perhaps for this reason that a great deal of attention has been directed towards the value of emotional support. Stressors without such a component (rightly or wrongly) tend to be regarded as lesser in impact and perhaps less likely to pose a threat to health owing to the absence of strong emotion known to exacerbate arousal responses. For this reason, laboratory studies into the effect of social support may not be typical of either the type or the duration of support that is the focus of research on the influence on health. Laboratory studies necessarily focus on non-real stressors, of short duration, which have no impact on personal well-being outside the laboratory. The tasks may involve some emotion such as apprehension but these are not major requirements for the need for support.

The studies also do not report adequately what support was perceived by subjects or whether this support was mobilised. Nor is it clear that it was the provision of social support in any form that was attributable for the reduction in cardiovascular responses. Some of the factors previously discussed in relationship to Friedmann's work may also be applicable to these experiments. For example, in Allen's work, it may be that the presence of a dog simply reduced the perceived importance of the stress task. In other studies (Karmack et al, 1990; Edens et al, 1992) the presence of a friend or colleague may have resulted in the subject not feeling alone rather than perceiving active support. Social interaction, either as a result of the facilitating effect of a dog or as an opportunity to talk with a friend may also have had an effect outside or instead of the provision of support.

The experiments are useful, helpful, but not conclusive. On a general, intuitive level one must acknowledge that the receipt of support, if accepted to alleviate potentially harmful effects on health, must have measurable physiological effects. However, it is debatable whether these experiments in their current form have, as yet, identified these effects. Much work is required to establish whether the presence of a friend, dog, or colleague is perceived as providing support before accepting the findings. In addition, it is suggested that studies involving the physiological status of people undergoing real life stressors over time should be undertaken for comparison of how received support influences the physiology of stress. If such studies reflected similar patterns in reduction as demonstrated by the laboratory experiments there would be adequate grounds for accepting that they are indeed demonstrating the physiological effects of social support.

SECTION 5

SUMMARY AND CONCLUSIONS

Chapter 12 Summary and conclusions

The aim of this thesis was to investigate the reported association between pets and health advantages and to present a framework whereby potential explanations could be examined.

Section 2 examined the view that whilst pets and health advantages may be associated, this may not be causal in nature, that some other factor or factors may promote health and the likelihood of owning a pet. The studies presented in this section examined Type A behaviour which is known to be associated with increased risk for stress related illness, especially coronary heart disease, and which may also be hypothesised to decrease the likelihood of pet ownership owing to the characteristics of this behaviour. It was found that Type A behaviour was not associated with lower incidence of pet ownership. Indeed, some aspects of Type A behaviour were more prevalent in pet owners, notably aspects concerning liking to keep busy, active and engaging in many activities at the same time.

Studies 2 and 3 examined the personality characteristic of hardiness, widely believed to be related to health through resilience to stress. Hardiness was found to significantly predict better health and lower incidence of symptoms associated with physical and psychological experiences of stress, but it was *not* associated with a higher likelihood of pet ownership. Thus the studies do not suggest that the association between pet ownership and health advantages is explainable simply in terms of differences between pet owners and non-owners in personality characteristics or personality type.

However, the hypothesis that the association between pet ownership and health is non-causal is considered important. It represents good research in its willingness to adopt a healthy scepticism for the association between two factors that do not

immediately present any obvious connection, and it may well lend credibility to further studies demonstrating health benefits if they can be seen to have accounted for factors that might have promoted both health and pet ownership. Such factors are likely to extend beyond personality characteristics to include lifestyles and absence of stressful events. For example, the benefits to health reported by Serpell (1991) subsequent to acquiring a pet may be more related to absence of minor hassles or stressors. It could be argued that a person is less likely to elect to own a pet at a time of stress or personal disruption. This was not fully investigated at the time of the study. Indeed, Serpell (personal communication) has noted that the health benefits he attributed to acquisition of a pet were negated when available data on life events was incorporated into a re-analysis.

Similarly, Saloman (1995) reported that pet owning children were more likely to be good achievers at school, were more likely to seek appropriate help and support when needed, and were more socially skilled. The pet owning children in her study were drawn from predominantly middle class American families who might be expected to be mindful of ways to enrich their children's education and encourage support seeking and academic achievement. Against a background of these aims, it could also be expected that such parents may well buy a pet for their children because they believed it may be beneficial. Thus the benefits and pet ownership are perhaps more attributable to the child-rearing practices of this particular class of American family.

So it can be seen that the non-causal association may be present in many guises and should be taken into consideration in research design to avoid a relationship being inferred where a more plausible, more parsimonious explanation is available.

The third section of the thesis focused on pets as potential enhancers of human social networks. This class of explanation proposed that whilst pets and health may be associated, this was an indirect association arising from benefits afforded by human

contact. It is very common for studies describing the benefits of pets on health to state that pets are powerful social facilitators, that they help owners to meet people and that this is one way that pets can exert a beneficial influence on the health of their owners. However, such statements have lacked empirical foundation in that it had not been adequately demonstrated that pets do act as social catalysts outside, for example, dog-walking areas, or, more importantly, that even if they did, this had an effect on health.

The first two studies in this section (studies 4 and 5) focused on whether pets do act as social catalysts and whether this effect is robust enough to generalise beyond dog walkers encountering each other in parks. Both studies demonstrated very considerable increases in interactions with people when in the company of a dog. This occurred outside dog walking areas and remained relatively unaffected by the appearance of either the dog or the handler. Thus it was concluded that the catalysis effect was indeed robust. However, in both studies it was noted that although the interactions experienced whilst with the dog increased, they remained casual and brief in nature, with seemingly little opportunity for developing the contact into a relationship.

This was taken up by study 6 which investigated the size and composition of social networks in dog owners, cat owners and non-owners, in relation to health. It also examined the proportion of the networks that could be attributable to pet ownership i.e. as a result of the pet being a social catalyst, and the supportive functions from the network. The findings suggest that very few relationships in a social network were attributable to pet ownership, even amongst dog owners. That is not to say that dogs did not act as social catalysts but that the encounters did not translate themselves into relationships which subjects regarded as part of their social networks. Nor did pet owners exhibit any discernible health benefits compared to non-owners in terms of alleviation of loneliness, self-esteem, psychological well-being or lower physical or psychological symptoms. Cat owners only showed a significantly lower incidence of

psychological symptoms but this was not attributable to size, composition or function of their social networks.

So it would appear that although the claims that pets can act as social catalysts is tenable, researchers should not be too precipitate in claiming that this equates with meeting people, making friends or enhancing psychological well-being through a sense of integration. To date these have been common claims and whilst they may have substance for populations at special risk of social isolation, such as people with disabilities, they do appear to be generalisable to ordinary pet owners. Thus accounts of beneficial influences of pet ownership should be very cautious in their claims for social enhancement.

It is also notable that claims for the social enhancement arising from pet ownership frequently imply that pets may be particularly effective in this, even uniquely so (e.g. Hunt, Hart & Gomulkiewicz, 1992). This must also be viewed with caution. Findings from study 6, and a subsequent study (McNicholas & Collis submitted) which compared relationships arising from pet ownership with those arising from hobbies, suggests that hobbies and recreational pursuits may be more effective at developing relationships than pet ownership, and at least as effective as pet-related hobbies. Thus the only firm conclusion can be that pets, especially dogs, may act as powerful social catalysts but that this does not translate into relationships likely to afford health advantages, nor are they as successful as hobbies or recreational pursuits.

The fourth section of the thesis was divided into two parts. Chapters 7 to 10 examined the nature of the relationship between owner and pet to identify any characteristics that may suggest that the functions of the relationship may exert a beneficial effect on health. The focus here was on the provision of social support directly from the pet as a significant relationship. Chapter 11 examined the physiological effects of the presence of a dog during a laboratory based stressor. Since many claims have been

made for a reduction in the physiological responses to stress whilst in the presence of an unfamiliar animal (as opposed to the subject's own pet) this was referred to as a strand of research which did not necessarily rely on the nature of the relationship between owner and pet.

The studies conducted on the relationship between owner and pet suggest that many people regard their pet as important relationship and that the relationship may indeed contain elements which mirror human social support. In study 7, children were found to regard pets as companions, friends with whom to share games and adventures, recipients of confidential information and providers of comfort or safety. In some circumstances, pets were preferred over human relationships, perhaps because they afforded no need for explanation, no conflict and simply because they made none of the relationship demands associated with human relationships. In this sense, pets could be seen as providing social support and an alleviation from some of the strains children undoubtedly experience in their relationships with friends and family.

The study was important because it did not simply examine what children thought of their pets, but placed the relationship within the context of the children's social network and existence of available support from human relationships. It was notable that children were highly selective in their choices of what sort of support was required and which relationship to access, and this must lend considerable strength to the findings that children do regard pets as significant relationships and that they are viewed as sources of support in addition to, and even in some circumstances in preference to, human relationships.

Pets were also regarded as important by the young people with autism. Again the study was conducted so as to enable a comparison with human relationships. It was found that the relationship with the pet was very different from that with human relationships, being much less hostile or aggressive, more tolerant and exhibiting

many features which were absent in human relationships. These included a pleasure at physical contact, greeting, lack of anger, seeking out when upset and taking pleasure in the pet's company. More verbal behaviour was directed to pets than to people, and there was some limited evidence of confiding problems or taking comfort from the pet in ways not shown in their human relationships.

The findings suggest that the subjects with autism were preferentially interacting with their pets and were using the pets in ways similar to that of seeking support, within the limits permitted by the autism. Whilst all carers agreed that the pet was important to the autistic person, it could not be said that the pets were beneficial to the autistic person in that they encouraged desirable behaviours or discouraged undesirable ones. Rather the two types of relationship remained distinct and separate, the more desirable behaviours directed toward the pet did not become directed towards people.

This is perhaps important when one considers the claims that pets are beneficial to people with autism where the implication is that interaction with the pet may 'release' behaviours which may then be demonstrated toward people. We found no such evidence that this occurs. It may also be that many people with autism may show no interest in a pet or some types of pets. In a subsequent unpublished case-study we found that a young girl diagnosed as classically autistic showed no interest in either a guinea pig or a dog, but interacted and talked freely with a gentle ferret. Why this animal should elicit this sort of behaviour whilst the other species did not is unknown, but it raises important considerations in claims for the use pet therapy amongst this particular population, and designs for pet-facilitated interventions.

Pets were also demonstrable as sources of support amongst recipients of Dogs for the Disabled. The nature of the relationship was one of affectionate and comfort at times of need, as well as providing a sense of security which promoted independence and self-esteem. Despite the fact that all recipients had permanent disabilities it was

surprising that a large proportion reported improvements in both physical and psychological well-being. This undoubtedly was due to their service dog, but the question arises of how much can be attributed directly to it. Indirect influences via enhanced mobility, confidence and independence certainly had a significant effect on self-reported health and well-being. However the greatest predictor of self-perceived health was social support from the dog.

The nature of the relationship between dog and owner was found to be important since without a fondness for the dog and a trust in its abilities, no further benefits of independence and self-esteem would be possible. But it is not clear that the better the relationship with the dog, the better the benefits derived, although it was clear that recipients who did not decide for themselves to apply for a service dog did not develop such a close relationship nor did they derive the same level of benefit. It would appear that a good relationship with the dog can promote the provision of social support from the relationship.

The benefits provided by the receipt of a Dog for the Disabled appear to be a mix of indirect and direct consequences on health and well-being. Whilst there was some evidence that the positive nature of the relationship between owner and dog afforded support-like qualities, there was also significant evidence that enhanced social networks and a sense of social integration affected perceptions of well-being. This is likely to be a consequence of the social facilitation afforded by the presence of a dog. However, the impact is likely to be greater in a population for whom the opportunities for social integration or social interaction is more limited. Thus this may be an instance where *for a special population* social catalysis may be said to have a positive effect on well-being.

A number of studies have claimed benefits for recipients of service dogs, especially in the enhancement of social opportunities and acceptance. However, unlike other areas

of research which have perhaps been too quick to infer health benefits from pet ownership, this strand of research has not investigated beneficial effects beyond social acceptance to health and well-being. This may be an important omission and provided that research can adequately account for benefits arising from both the direct effects (e.g. the relationship) and the indirect effects (enhanced social networks, self-esteem and independence), it should be an area well worth pursuing.

The final two studies of the thesis investigated the claims that the presence of a dog can reduce the physiological responses to stress under laboratory conditions. Two potential mechanisms were examined. Firstly, if the presence of the dog resulted in lower levels of baseline recordings in heart rate, systolic and diastolic blood pressure were observed than for subjects tested without the dog present (a main effect), it could be inferred that the dog was exerting an indirect influence on subjects through their perception of the experiment as perhaps less serious or important. Secondly, if the reactivity to the stress task (a task*condition interaction) were less in subjects with the dog present, it could be inferred that the dog's presence was having a direct effect on the levels of cardiovascular arousal to the stressor.

In both experiments neither a main effect of the dog's presence nor an interaction between the dog's presence and the level of cardiovascular reactivity was observed, suggesting that the dog had no significant effect on subjects' appraisal or reactivity to the task. Levels of cardiovascular activity was significantly greater in the task phases, indicating that the procedure was satisfactory. However, the presence of the dog exerted no influence on reactivity. The second of the two experiments once again took up the implicit claims that pets are especially beneficial by adopting a contrast condition, that of playing soft music, often claimed to be soothing and alleviating stress. This also showed no significant reduction in levels of cardiovascular responsivity.

Despite the very widespread claims for the stress-reducing qualities of pets, neither the two studies reported here, nor two subsequent studies conducted in the department under the author's supervision, have been able to demonstrate any significant effect of a dog on physiological responses to stress. Indeed, it would appear that the effect is not at all robust. Even the published studies differ greatly in their findings and their explanation, ranging from a finding of main effect only as shown by Friedmann et al 1983, who somewhat inaccurately interpreted a main effect as if it were an interaction in suggesting that it showed a reduction in reactivity to a stressor, to no effects (Grossberg et al, 1985), to the one study which does show a reduction in reactivity, although only for subjects in their own homes (Allen et al, 1991)

It would therefore appear that the claims for pets reducing cardiovascular responses to stress far exceed the available evidence. Equally, it has not been adequately demonstrated that any reductions, even where found, are sufficient to afford health benefits. This would require evidence to suggest not only that the reductions are of a sufficient magnitude but that they are frequent enough or sustained enough to give real advantage. Since pets are unlikely to be present during many times of stress, and it is not known whether pets can 'defuse' stress after an event, or how they may do so, it would seem that the claims that pets may beneficially influence cardiovascular health are rather difficult to uphold. In addition there is the problem that has dogged researchers outside the field of companion animal studies who investigate whether vulnerability to cardiovascular disease can be predicted by high reactivity to a laboratory stressor - is reactivity in the laboratory the same as that in 'real world' situations? In conclusion it would seem unsafe to make claims that pets can exert any significant influence on cardiovascular health. A further major difficulty is that laboratory stressors are, by virtue of their design, acute, short lasting and perceived as minor, whilst more major stressors tend to lead to chronic stress responses. Since chronic stress can lead to vulnerability to illnesses other than cardiovascular disease, in particular vulnerability to infectious disease and tumour formation through

suppression of the immune system, investigation of cardiovascular reactivity to stress may be only a small part of the stress-illness link.

So what evidence is there that pet ownership is associated with health, whatever the class of explanation that may best fit? On the basis of studies conducted for this programme of research, there is very little evidence of pet ownership bringing health advantages. Of the eleven studies, seven investigated some form of health outcome. Only two showed any health benefits for pet owners, and even then only a limited amount of evidence. Cat owners in Study 6 did demonstrate a lower level of psychological symptomatology and in study 9, recipients of Dogs for the Disabled reported improvements in self-reported health. On the strength of the findings it would be difficult to make generalisable claims that pets do indeed promote health advantages in ways that be quantifiable as benefits to either physical health or psychological well-being.

What is clear, however, is that pets are important to their owners irrespective of whether those owners demonstrate any health advantages. This perhaps points to pets as an important element for many people in their assessment of their quality of life. The fact that owners are very fond of their pets, regard them as significant relationships, or as sources of recreation, companionship and support, does not have to be translated into objective health benefits to warrant appreciation, although it does change the focus of how research into person-pet relationships may be conducted. Perhaps the focus on pets as promoters of health benefits is too narrow a focus. It cannot explain why people elect to own pets, often adopting pet ownership as a permanent feature of their lifestyle, nor why people balance the cost in terms of time, energy, responsibility and money to perceive an overall net gain out of pet ownership, often to the extent that they are never voluntarily without a pet. Nor can a focus into health benefits hope to reveal what people perceive themselves to gain from keeping a

pet. Is companionship, recreation, or the relationship with the pet only valuable in terms of measurable health benefits?

It is suggested that pets do contribute a great deal to the quality of life for people who elect to own them and may form part of a constellation of factors that contribute to well-being and quality of life. Maybe such a constellation of factors combined can lead to measurable health benefits, even if individually they do not . Thus, pets may not always bring about health benefits, nor may they be any more special than an absorbing hobby or interest, and whilst studies should be wary of overstating either of these factors, research should continue to examine the role of pets in people's lives and whether they co-occur with other factors which could enhance quality of life. To the extent that humans are motivated to form relationships with other species, and that pets are valued, loved even, missed greatly when they die or are lost, they are important and the relationship between humans and pets is deserving of scientific research.

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Appendix 1 Questionnaire for study 1

Questions 13 to 27 comprise the Type A Scale of Järvikoski & Härkäpää (1987).

You have been randomly selected for a survey being conducted by Coventry City Council and the University of Warwick. It aims to examine relationships between health and aspects of lifestyle. We would be grateful if you would fill in the questionnaire as accurately as you can. All information you give will be anonymous and completely confidential.

Your details.

1. Sex Male ☐ Female ☐ (tick box)

2. Age (tick one box)

17-25 ☐ 26-35 ☐ 36-45 ☐
46-55 ☐ 56-65 ☐

3. Employment (Please state grade or post).....

4. In the last 2 years have you:-(please tick)

Been divorced/separated ☐ Been widowed ☐

Had a major illness ☐ what illness?

5. People living in your household.

Spouse/partner ☐ Child(ren) over 16 ☐

Live alone ☐ Child(ren) under 16 ☐

6. Pets in your household (please give number of each)

Cats ☐ Dogs ☐ Birds ☐
None ☐ Fish ☐ Others ☐ please state.....

7. Are any of these especially *your* pet(s)?

No ☐ Yes ☐ If so, which?

.....

8. How do you rate your current health (please tick one)

Poor ☐ A few problems ☐ Fair ☐ Good ☐ Excellent ☐

9. How do rate your current physical fitness?

Poor ☐ Fair ☐ Good ☐ Excellent ☐

10. Do you smoke?

No ☐ Yes ☐ If yes, how many per day?

11. Do you drink alcohol?

No ☐ Yes ☐ If Yes, is your intake equivalent to (please tick)

Less than 3 pints of beer (or 6 measures of spirit) per week ☐

Up to 7 pints of beer (or 14 measures of spirit) per week ☐

Up to 12 pints of beer (or 24 measures of spirit) per week ☐

More than 12 pints of beer (or 24 measures of spirit) per week ☐

12. Are you a member of any clubs or societies?

Yes ☐ No ☐

If yes, how many do you belong to?..... ..

Do you attend club/society meetings?

Yes ☐ No ☐

If yes do you attend

Weekly ☐ Monthly ☐ Other ☐ (please state)..... ..

The following statements concern your ways of acting in different situations. Please tick the box you feel is most appropriate.

13. I am often not punctual and late for appointments.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. I get impatient when I have to wait or queue.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. I do not like competing or setting difficult goals.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. I usually eat faster than other people.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. I am very seldom in a hurry.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. I do not usually compare my achievements with others.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. I generally walk fast even if I am not in a hurry.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20. I often do many things at once.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. I am not easily irritated.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

22. I am ambitious and always strive for new goals and better results.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

23. I am always calm and easy going.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

24. I always try to be energetic and efficient.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

25. I often interrupt others when they are talking or finish their sentences for them.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

26. I relax fully during my leisure time; work problems do not even cross my mind.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

27. I enjoy life most when I have lots of work to do.

Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree

Thank you for participating in this study. Please be assured that your answers will be treated in the strictest confidence and will not be used for purposes other than this study.

Please return the completed questionnaire to the Occupational Health Unit, using the envelope provided.

Appendix 2 Questionnaire for study 2

Healthy Living Survey

A research group at the University of Warwick are conducting a survey of the effects of lifestyle and attitudes on health and well-being. We would be grateful if you would complete this questionnaire as accurately as you can. All information we receive will be treated as anonymous and confidential, so you can be as truthful as you like. No information you give as an individual will be revealed or used for any purpose outside this study.

Your details.

1. Sex Male ☐ Female ☐ (please tick one box)

2. Age (please tick one box)

17-25	<input type="checkbox"/>	26-35	<input type="checkbox"/>	36-45	<input type="checkbox"/>
46-55	<input type="checkbox"/>	56-65	<input type="checkbox"/>	over 65	<input type="checkbox"/>

3. Employment (Please state current/last grade or post)

Has your job involved shift work? Yes ☐ No ☐

If Yes, describe shift times

4. In the last 2 years have you:-(please tick any that apply)

Been divorced/separated	<input type="checkbox"/>	Had a major illness	<input type="checkbox"/>
Been widowed	<input type="checkbox"/>	what illness?	

.....

5. People living in your household (please tick any that apply)

Spouse/partner	<input type="checkbox"/>	Siblings over 16	<input type="checkbox"/>
Live alone	<input type="checkbox"/>	Siblings under 16	<input type="checkbox"/>
Parent(s)	<input type="checkbox"/>	Grandparents	<input type="checkbox"/>
Other	<input type="checkbox"/>	Child(ren)	<input type="checkbox"/>

6. Pets in your household at your home address (please give number of each)

None	<input type="checkbox"/>	Dogs	<input type="checkbox"/>	Birds	<input type="checkbox"/>
Cats	<input type="checkbox"/>	Fish	<input type="checkbox"/>	Others	<input type="checkbox"/>

 please state

7. Are any of these especially *your* pet(s)?

No ☐ Yes ☐ If so, which?

.....

8. How do you rate your current health (please tick one)

Poor ☐ A few problems ☐ Fair ☐ Good ☐ Excellent ☐

10. How do rate your current physical fitness?

Poor ☐ Fair ☐ Good ☐ Excellent ☐

11. Do you smoke?

No ☐ Yes ☐ If yes, how many per day?

12. Do you drink alcohol?

No ☐ Yes ☐ If Yes, is your intake equivalent to (please tick)

Less than 3 pints of beer (or 6 measures of spirit) per week ☐

Up to 7 pints of beer (or 14 measures of spirit) per week ☐

Up to 12 pints of beer (or 24 measures of spirit) per week ☐

More than 12 pints of beer (or 24 measures of spirit) per week ☐

13. Are you a member of any clubs or societies?

Yes ☐ No ☐

If yes, how many do you belong to?.....

Do you attend club/society meetings?

Yes ☐ No ☐

If yes do you attend

Weekly ☐ Monthly ☐ Other ☐ (please state).....

14. Do you take regular exercise?

Yes ☐ No ☐ If yes, how frequently?

Daily ☐ 2/3 times per week ☐ weekly ☐

Less than once a week ☐

15. Do you eat takeaway or convenience food?

Yes ☐ No ☐ If yes, how frequently?

Daily ☐ 2/3 times per week ☐ weekly ☐

Less than once a week ☐

16. What best describes your sleep patterns? (tick one that most describes your overall sleep pattern)

a) At times when there are no social pressures or work/study pressures

- Very regular - mostly same time retiring and getting up☐
- Quite regular - more often than not the same time to bed and getting up☐
- Not very regular - quite changeable times of retiring and getting up☐
- Rather irregular - very changeable times of retiring and getting up☐
- Highly irregular - not pattern at all to sleep☐

b) When there are work/study pressures

- Very regular - mostly same time retiring and getting up☐
- Quite regular - more often than not the same time to bed and getting up☐
- Not very regular - quite changeable times of retiring and getting up☐
- Rather irregular - very changeable times of retiring and getting up☐
- Highly irregular - not pattern at all to sleep☐

17. The list below shows some of the things that people think are important in their life. Circle the number at the point that you feel most reflects how important each item is for you.

scoring 0 = no importance whatsoever
1 = very minor importance
2 = slightly important
3 = quite important
4 = very important
5 = extremely important

Marriage/ permanent partnership	0	1	2	3	4	5
Travel	0	1	2	3	4	5
Children	0	1	2	3	4	5
Buying/owning your own home	0	1	2	3	4	5
Friends/social life	0	1	2	3	4	5
A very demanding job	0	1	2	3	4	5
Owning a pet of your choice	0	1	2	3	4	5
A highly paid job	0	1	2	3	4	5
A satisfying job	0	1	2	3	4	5
Sport	0	1	2	3	4	5
Keeping up my current interests and hobbies	0	1	2	3	4	5

Appendix 3: Dispositional Resilience Scale (DRS30)
(Bartone et al (1989) used in studies 2 & 3

Below are statements that people often feel differently about. Circle a number to show how you feel about each one. Read the items carefully and indicate how much you think each one is true in general. There are no right or wrong answers; just give your own honest opinions.

Please circle one answer only

0= Not at all true
1= A little true
2= Quite true
3= Completely true

Not at all true
A little true
Quite true
Completely true

1. Most of my life gets spent doing things that are worthwhile	0	1	2	3
2. Planning ahead can help avoid most future problems	0	1	2	3
3. No matter how hard I try, my efforts usually accomplish nothing	0	1	2	3
4. I don't like to make changes in my everyday schedule	0	1	2	3
5. The 'tried and true' ways are always the best	0	1	2	3
6. Working hard doesn't matter since only the bosses profit by it	0	1	2	3
7. By working hard you can always achieve your goals	0	1	2	3
8. Most of what happens in life is just meant to be	0	1	2	3
9. When I make plans, I'm certain I can make them work	0	1	2	3
10. It's exciting to learn something about myself	0	1	2	3
11. I really look forward to my work	0	1	2	3
12. If I'm working on a difficult task, I know when to seek help	0	1	2	3
13. I won't answer a question until I'm really sure I understand it	0	1	2	3
14. I like a lot of variety in my work	0	1	2	3
15. Most of the time people listen carefully to what I say	0	1	2	3
16. Thinking of yourself as a free person just leads to frustration	0	1	2	3
17. Trying your best at work really pays off in the end	0	1	2	3
18. My mistakes are usually very difficult to correct	0	1	2	3
19. It bothers me when my daily routine gets interrupted	0	1	2	3
20. Most good athletes and leaders are born, not made	0	1	2	3
21. I often wake up eager to take up my life wherever it left off	0	1	2	3

22. Lots of times, I don't really know my own mind	0	1	2	3
23. I respect rules because they guide me	0	1	2	3
24. I like it when things are uncertain or unpredictable	0	1	2	3
25. I can't do much to prevent it if someone wants to harm me	0	1	2	3
26. Changes in routine are interesting to me	0	1	2	3
27. Most days life is really interesting and exciting for me	0	1	2	3
28. It's hard to imagine anyone getting excited about working	0	1	2	3
29. What happens to me tomorrow depends on what I do today	0	1	2	3
30. Ordinary work is just too boring to be worth doing	0	1	2	3

Appendix 4 Questionnaire for study 3

Healthy Lifestyle Questionnaire

A research group at the University of Warwick are conducting a survey of the effects of lifestyle and attitudes on health and well-being. We would be grateful if you would complete this questionnaire as accurately as you can. All information we receive will be treated as anonymous and confidential, so you can be as truthful as you like. No information you give as an individual will be revealed or used for any purpose outside this study.

Your details.

1. Sex

Male☐

Female☐

(please tick one box)

2. Age

(tick one box)

17-25☐

26-35☐

36-45☐

46-55☐

56-65☐

over 65☐

3. Subject & year of study.....

3a. During term time do you live (please tick one box)

At family home☐

Away from home☐

4. In the last 2 years have you:-(please tick any that apply)

Split up with boyfriend/girlfriend/partner☐

Had a major illness☐

Been bereaved of a family member☐

what illness?

.....

5. People living in your household (please tick any that apply)

Spouse/partner☐

Siblings over 16☐

Live alone☐

Siblings under 16☐

Parent(s)☐

Grandparents☐

Other☐

Child(ren)☐

6. Pets in your household at your home address (please give number of each)

None☐

Dogs☐

Birds☐

Cats☐

Fish☐

Others☐

please state.....

7. Are any of these especially *your* pet(s)?

No☐

Yes☐

If so, which?

.....

8. How do you rate your current health (please tick one)

Poor ☐ A few problems ☐ Fair ☐ Good ☐ Excellent ☐

10. How do rate your current physical fitness?

Poor ☐ Fair ☐ Good ☐ Excellent ☐

11. Do you smoke?

No ☐ Yes ☐ If yes, how many per day?

12. Do you drink alcohol?

No ☐ Yes ☐ If Yes, is your intake equivalent to (please tick)

Less than 3 pints of beer (or 6 measures of spirit) per week ☐

Up to 7 pints of beer (or 14 measures of spirit) per week ☐

Up to 12 pints of beer (or 24 measures of spirit) per week ☐

More than 12 pints of beer (or 24 measures of spirit) per week ☐

13. Are you a member of any clubs or societies?

Yes ☐ No ☐

If yes, how many do you belong to?.....

Do you attend club/society meetings?

Yes ☐ No ☐

If yes do you attend

Weekly ☐ Monthly ☐ Other ☐ (please state).....

14. Do you take regular exercise?

Yes ☐ No ☐ If yes, how frequently?

Daily ☐ 2/3 times per week ☐ weekly ☐

Less than once a week ☐

15. Do you eat takeaway or convenience food?

Yes ☐ No ☐ If yes, how frequently?

Daily ☐ 2/3 times per week ☐ weekly ☐

Less than once a week ☐

16. What best describes your sleep patterns? (tick one that most describes your overall sleep pattern)

a) At times when there are no social pressures or work/study pressures

- Very regular - mostly same time retiring and getting up ☐
- Quite regular - more often than not the same time to bed and getting up ☐
- Not very regular - quite changeable times of retiring and getting up ☐
- Rather irregular - very changeable times of retiring and getting up ☐
- Highly irregular - not pattern at all to sleep ☐

b) When there are work/study pressures

- Very regular - mostly same time retiring and getting up ☐
- Quite regular - more often than not the same time to bed and getting up ☐
- Not very regular - quite changeable times of retiring and getting up ☐
- Rather irregular - very changeable times of retiring and getting up ☐
- Highly irregular - not pattern at all to sleep ☐

17. The list below shows some of the things that people think are important in their life. Circle the number at the point that you feel most reflects how important each item is for you.

scoring 0 = no importance whatsoever
1 = very minor importance
2 = slightly important
3 = quite important
4 = very important
5 = extremely important

Marriage/ permanent partnership	0	1	2	3	4	5
Travel	0	1	2	3	4	5
Children	0	1	2	3	4	5
Buying/owning your own home	0	1	2	3	4	5
Friends/social life	0	1	2	3	4	5
A very demanding job	0	1	2	3	4	5
Owning a pet of your choice	0	1	2	3	4	5
A highly paid job	0	1	2	3	4	5
A satisfying job	0	1	2	3	4	5
Sport	0	1	2	3	4	5
Keeping up my current interests and hobbies	0	1	2	3	4	5

PHYSICAL SYMPTOM CHECKLIST

--

Your Age		Gender		Year of study	
----------	--	--------	--	---------------	--

In what sort of accommodation have you lived this term (please tick)

Campus accomm		Student house/flat off campus		Lodgings		Own/family home	
------------------	--	----------------------------------	--	----------	--	--------------------	--

Please think about the time from the time you started at Warwick until now.
During this time have you experienced any of these symptoms? Please tick one box per line.

much more than usual
slightly more than usual
about the same as usual
slightly less than usual
much less than usual
no, not at all

0 1 2 3 4 5

1	Headaches						
2	Sore throats						
3	Feeling faint/dizzy						
4	Pains in the chest						
5	Trembling/shakiness/feeling 'jittery'						
6	Poor appetite						
7	Crying or feeling tearful						
8	Back pain						
9	Heart pounding or racing						
10	Nausea or upset stomach						
11	Indigestion or heartburn						
12	Achiness in your muscles						
13	Trouble getting to sleep						
14	Shortage of breath/feeling breathless						
15	Hot or cold spells						
16	A lump in your throat						
17	Numbness/tingling in your body						
18	Waking up too early						
19	Overeating						
20	Feeling of body weakness						
21	Heavy feeling in arms or legs						
22	Restless/disturbed sleep						
23	Bowel problems (such as constipation, diarrhoea)						
24	Skin rashes						
25	Dental problems (such as toothache, gum pain)						
26	Feeling run down						
27	Colds, coughs, flu						
28	Ear problems (ear ache, temporary hearing loss)						
29	Eye problems (sore/irritated/watery, blurred vision)						
30	Hands sweat and feel damp and clammy						

PSYCHOLOGICAL SYMPTOM CHECKLIST

Please think about the time from the time you started at Warwick until now.
During this time have you experienced any of these symptoms? Please tick one box per line.

much more than usual

slightly more than usual

about the same as usual

slightly less than usual

much less than usual

no, not at all

0

1

2

3

4

5

1	Repeated unpleasant thought that won't leave your mind						
2	Trouble remembering things						
3	Feeling easily annoyed or irritated						
4	Feeling scared for no reason						
6	Blaming yourself for things						
7	Feeling alone/isolated						
8	Feeling miserable/unhappy or downhearted						
9	Feeling panicky about the future						
10	Feelings of impatience and intolerance						
11.	Worrying too much about things						
12.	Feeling you have no interest in anything						
13.	Your feelings being easily hurt						
14.	Feeling that other people do not understand you or are unsympathetic						
15.	Your mind going blank						
16.	Feeling hopeless about the future						
17.	Having trouble concentrating						
18.	Feeling tense/keyed up						
19.	Feelings of anger, resentment or bitterness						
20.	Feeling everything is an effort						
21.	Feeling lonely even if you are with other people						
22.	Feeling you are worthless						
23.	Wanting to shout or throw, smash or hit things						
24.	Feelings of guilt						
25.	Feeling you do not want to be bothered with people						
26.	Wanting to be alone						
27.	Having disturbing dreams						
28.	Feeling it is just not worth doing anything around the home						
29	Being very easily startled						
30	Finding it very difficult to relax						

Appendix 5:

Questionnaire and interview schedule used in study 6.

Section 1 Background details

Section 2 Current health status

Section 3 Life Events Checklist

Section 4 The social network interview

interview schedule

network sheet (reduced from A3)

relationship descriptors

Section 5 Dupuy's Psychological General Well-being Scale

Section 6 Battle's Self esteem Scale

Section 7 UCLA Loneliness Scale

Section 8 Health Checklists

(1) physical symptoms

(2) psychological symptoms

Section 9 People pet through pet

3. Overall, would you rate your current health as:

- Poor
- A few problems
- Fair
- Good
- Excellent
- []
- []
- []
- []
- []

Section 3: Life Events Checklist

I will read out a series of events which sometimes bring about changes in our lives which may be stressful. Please tell me which events you have experienced within the last 6 months and indicate the extent to which you viewed these events as having a positive or negative impact on your life.

- Level of impact:
- 1 = Extremely negative
- 2 = Slightly negative
- 3 = No impact
- 4 = Slightly positive
- 5 = Extremely positive

	1	2	3	4	5
Had financial difficulties (eg loan repayments, mortgage)					
You have had a serious illness or injury					
Got married/engaged					
Family argument that has left bad feelings					
Been made redundant					
Moved house (or thought about moving)					
Death of a pet					
Someone has come to live with you (or left home)					
Retired					
Been the victim of a robbery or other crime					
Met a new partner					
A close friend or colleague died					
Had disagreements with your boss, supervisor or fellow workers					
Had legal problems					
Death of a family member					
Have become better off financially					
A close family member or friend has had a serious illness or injury					
Serious problems with a neighbour, close friend, or relative not living at home					
Gained a new family member					
Become divorced/ separated					
Changed work					
Had increasing arguments with your partner					
Any other event/s you can think of which have not been mentioned?					
1.....					
2.....					

Section 4: The social network interview

The purpose of this part of the research is to obtain an in-depth view of your network of social relationships with other people.

Part A

The first thing I would like you to do is to identify all the individuals who you feel play a significant role in your social life. These will mostly be people you see fairly regularly (or perhaps communicate with by telephone or letter) and who have some impact on your personal life. Thus for example, this would not include people at work who are just there or who you communicate with solely for the purposes of work, but you would include people you clearly like or dislike, and those who you greet or are greeted by for reasons of more than politeness and good manners. Much the same goes for people you see in other parts of your life. It may well include people who you do not even know by name but who you see regularly and perhaps exchange pleasantries with.

To help this process, I will read out a number of categories. These will be as follows:

- People who live in the same household as you
- Your relatives who do not live in the same household as yourself, subdivided into those you feel close (regard as friends) to and others
- Close friends
- Colleagues at work, subdivided into those you feel close to and others.
- Colleagues in any voluntary work you do, e.g.. School Governors, Local Council, Hospital visiting, work for a Charity, work for a club or society where your main role is managing the organisation, subdivided into those you feel close to and others.
- People you associate with in clubs, societies or informal gatherings e.g. sport, dances, etc., subdivided into those you feel close to and others.
- People you know from other contexts, subdivided into those you feel close to and others. This may include people met casually, e.g.. Through your children (children's friends, their parents, other parents with children at the same school, etc.); when out shopping; when waiting for / travelling on bus or by train; when you are out walking; when you go to the Pub, to the Take Away, to Bingo, etc. Also people you see when you are at home (passers by, postman, milkman and other who call) and people you meet in other ways. Please also include friends that do not fit into any of the other columns, and perhaps professional people such as a doctor or solicitor if they are personally or particularly important to you.

It is important that each person appears in one category only. Also, it may be that some categories are not applicable to you-in which case please indicate and we will move on to the next category.

In general, I do not need to identify the people specifically, so you can call them what you like - e.g. first name, or by any other label that means something to you. However, it is helpful if you give each a unique label, so if you know several David's, perhaps you would call them David M., David the barman, or whatever was appropriate. For your relatives (and other people in your household), we need to know the nature of the family tie with you, e.g. wife/husband, son daughter (with age), your mother/father.

For people at work, please indicate whether they are senior to you (e.g. your boss or manager), junior to you (someone you oversee or assign work to), or have the same role as you.

Where you do not know the name of someone who nonetheless features in your life. For example, you could label the tall lady in the post office as "tall PO lady", or the ginger-haired boy's mother might be "ginger's mum. Use whatever labels that come easy to you,

Part B

The interviewer now gives one copy of the list as a prompt for the participant

The participant should be reminded that if, during the rest of the interview, he/she thinks of further people who should be included, these can be added to the list (but add to both participant's and interviewer's copy!)

Now, for the people you have listed, I would like you to indicate how frequently you see (or communicate with) each person, and how long you have known them.

Interviewer will code as follows.

Frequency codes	1	people seen almost everyday
	2	2-3 times per week
	3	usually about once per week
	4	generally at least once per month
	5	less often than once per month
Longevity codes	6	one month or less
	7	1 to 3 months
	8	3 to 6 months
	9	6 months to 2 years
	10	2 to 5 years
	11	5 to 10 years
	12	more than 10 years

Part C

Tell me which clubs, societies and other organisations that you are involved in.

Distinguish between:

1. Clubs the participant is involved in running
2. Clubs the participant regularly attend meetings of
3. Clubs the participant is merely a member

Part D

Now please look at the following descriptions of how you might feel about someone, Which of the people on your list come to mind in relation to each description.

It is quite likely that some of the people you nominated might not appear anywhere on this form. Do not worry about this. Also, do not worry if some of the descriptions apply to no one on your list.

When working through this list, you may find yourself thinking of people you did not nominate in part A. It is perfectly OK to add them to part A,

*Participant has list of descriptors (and his/her list of people) as a prompt.
Interviewer enter labels on to form,*

Please put each person in one category only

[illegible]

PART D: RELATIONSHIP DESCRIPTORS

IDNO.....

People I feel I don't have to put on a pretence with
People I would make time to be with
People I enjoy doing things for
People who I find it hard to get along with
People I would feel easy about asking for help/advice
People who I find very likeable
People I feel I get along well with
People who accept me the way I am
People who upset me more often than not
People I can relax with
People who would still think well of me even if we disagreed
People who make me feel good about myself
People who are special to me
People I always seem to rub up the wrong way
People I find it easy to laugh with
People who I easily exchange ideas and thoughts with

People I feel I can trust with personal information

People who would never try to put me down or make me feel inferior

People I try to keep my distance from

People who would notice if I wasn't around

People who would offer advice or help even if I didn't ask them

People who I exchange small favours with

People who I would seek out when I was feeling low

People who help distract me from everyday worries

People who try to put me down, make me feel inferior

People I feel caring towards

People I feel I know well

People I have a lot in common with

People I can easily talk to

People I feel I can discuss problems with

People I regard as good company

People who care about me

Section 5

Idno.....

This section will ask about you about how you feel and how things have been going during the past month. For each question please tick the box next to the answer which best applies to you.

1. How have you been feeling in general?

- ☐ In excellent spirits
- ☐ In very good spirits
- ☐ In good spirits mostly
- ☐ I have been up and down in spirits a lot
- ☐ In low spirits mostly
- ☐ In very low spirits

2. How often were you bothered by any illness, bodily disorder, aches or pains?

- ☐ Every day
- ☐ Almost every day
- ☐ About half the time
- ☐ Now and then, but less than half the time
- ☐ Rarely
- ☐ None of the time

3. Did you feel depressed?

- ☐ Yes-to the point that I felt like taking my own life
- ☐ Yes-to the point that I did not care about anything
- ☐ Yes-very depressed almost every day
- ☐ Yes-quite depressed several times
- ☐ Yes-a little depressed now and then
- ☐ No-never felt depressed at all

4. Have you been in firm control of your behaviour, thoughts, emotions, or feelings?

- ☐ Yes, definitely so
- ☐ Yes, for the most part
- ☐ Generally so
- ☐ Not too well
- ☐ No, and I am somewhat disturbed
- ☐ No, and I am very disturbed

5. Have you been bothered by nervousness or your "nerves"?

- ☐ Extremely so, to the point where I could not work or take care of things
- ☐ Very much so
- ☐ Quite a bit
- ☐ Some-enough to bother me
- ☐ A little
- ☐ Not at all

6. How much energy, pep, or vitality did you have or feel?

- ☐ Very full of energy-lots of pep
- ☐ Fairly energetic most of the time
- ☐ My energy level varied quite a bit
- ☐ Generally low in energy or pep
- ☐ Very low in energy or pep most of the time
- ☐ No energy or pep at all-I felt drained, sapped

7. I felt down hearted and blue.

- ☐ None of the time
- ☐ A little of the time
- ☐ Some of the time
- ☐ A good bit of the time
- ☐ Most of the time
- ☐ All of the time

8. Were you generally tense or did you feel any tension?

- ☐ Yes, extremely tense, most or all of the time
- ☐ Yes, very tense most of the time
- ☐ Not generally tense, but did feel fairly tense several times
- ☐ I felt a little tense a few times
- ☐ My general tension level was quite low
- ☐ I never felt tense or any tension at all

9. How happy, satisfied, or pleased have you been with your personal life?

- ☐ Extremely happy-could not have been more satisfied or pleased
- ☐ Very happy most of the time
- ☐ Generally satisfied-pleased
- ☐ Sometimes fairly happy, sometimes fairly unhappy
- ☐ Generally dissatisfied, unhappy
- ☐ Very dissatisfied or unhappy most of the time

10. Did you feel healthy enough to carry out the things you like to do or had to do?

- ☐ Yes-definitely so
- ☐ For the most part
- ☐ Health problems limited me in some mportant ways
- ☐ I was only healthy enough to take care of myself
- ☐ I needed some help in taking care of myself
- ☐ I needed someone to help me with most or all of the things I had to do

11. Have you felt so sad, discouraged, hopeless, or had so many problems that you wondered if anything was worthwhile?

- ☐ Extremely so-to the point that I have just about given up
- ☐ Very much so
- ☐ Quite a bit
- ☐ Some-enough to bother me
- ☐ A little bit
- ☐ Not at all

12. I woke up feeling fresh and rested.

- ☐ None of the time
- ☐ A little of the time
- ☐ Some of the time
- ☐ A good bit of the time
- ☐ Most of the time
- ☐ All of the time

13. Have you been concerned, worried, or had any fears about your health?

- ☐ Extremely so
- ☐ Very much so
- ☐ Quite a bit
- ☐ Some, but not a lot
- ☐ Practically never
- ☐ Not at all

14. Have you had any reason to wonder if you were losing your mind, or losing control over the way you act, talk, think, feel or loss of your memory?

- ☐ Not at all
- ☐ Only a little
- ☐ Some-but not enough to be concerned or worried about
- ☐ Some and I have been a little concerned
- ☐ Some and I am quite concerned
- ☐ Yes, very much so and I am very concerned

15. My daily life was full of things that were interesting to me.

- ☐ None of the time
- ☐ A little of the time
- ☐ Some of the time
- ☐ A good bit of the time
- ☐ Most of the time
- ☐ All of the time

16. Did you feel active, vigorous, or dull, sluggish?

- ☐ Very active, vigorous every day
- ☐ Mostly active, vigorous-never really dull sluggish
- ☐ Fairly active, vigorous-seldom dull, sluggish
- ☐ Fairly dull, sluggish- seldom active, vigorous
- ☐ Mostly dull, sluggish-never really active, vigorous
- ☐ Very dull, sluggish every day

17. Have you been anxious, worried, or upset?

- ☐ Extremely so-to the point of being sick or almost sick
- ☐ Very much so
- ☐ Quite a bit
- ☐ Some-enough to bother me
- ☐ A little bit
- ☐ Not at all

18. I was emotionally stable and sure of myself.

- ☐ None of the time
- ☐ A little of the time
- ☐ Some of the time
- ☐ A good bit of the time
- ☐ Most of the time
- ☐ All of the time

19. Did you feel relaxed, at ease or high strung, tight, or keyed-up?

- ☐ Felt relaxed and at ease for the whole month
- ☐ Felt relaxed and at ease most of the time
- ☐ Generally felt relaxed but at times felt fairly highly strung
- ☐ Generally felt high strung but at times felt fairly relaxed
- ☐ Felt high strung, tight, or keyed-up most of the time
- ☐ Felt high strung, tight keyed up the whole month

20. I felt cheerful, light-hearted.

- ☐ None of the time
- ☐ A little of the time
- ☐ Some of the time
- ☐ A good bit of the time
- ☐ Most of the time
- ☐ All of the time

21. I felt tired, worn out, used up, or exhausted.

- ☐ None of the time
- ☐ A little of the time
- ☐ Some of the time
- ☐ A good bit of the time
- ☐ Most of the time
- ☐ All of the time

22. Have you been under or felt you were under any strain, stress, or pressure?

- ☐ Yes-almost more than I could bear or stand
- ☐ Yes-quite a bit of pressure
- ☐ Yes, some-more than usual
- ☐ Yes, some-but about usual
- ☐ Yes, a little
- ☐ Not at all

Section 6

Idno.....

Below are a series of statements relating to our beliefs about ourselves. Please indicate whether you agree or disagree with each statement by placing a tick in the appropriate box.

		Yes	No
1	Are you happy most of the time?		
2	Can you do most things as well as others?		
3	Do you spend most of your time alone?		
4	Do you like being female / male?		
5	Do most people you know like you?		
6	Are you usually successful when you attempt important tasks or assignments?		
7	Are you as intelligent as most people?		
8	Do you feel you are as important as most people?		
9	Are you easily depressed?		
10	Would you change many things about yourself if you could?		
11	Are you as nice looking as most people?		
12	Do many people dislike you?		
13	Are you usually tense or anxious?		
14	Are you lacking in self-confidence?		
15	Do you often feel that you are no good at all?		
16	Are you as strong and healthy as other people?		
17	Are your feelings easily hurt?		
18	Is it difficult for you to express your views or feelings?		
19	Do you often feel ashamed of yourself?		
20	Are other people generally more successful than you are?		
21	Do you feel uneasy much of the time without knowing why?		
22	Would you like to be as happy as other people appear to be?		
23	Are you a failure?		
24	Do people like your ideas?		
25	Is it hard for you to meet more people?		
26	Are you often upset about something?		
27	Do most people respect your views?		
28	Are you more sensitive than most people?		
29	Are you as happy as most people?		
30	Are you definitely lacking in initiative?		
31	Do you worry a lot?		
32	Do you only have a few friends?		

Section 7

Idno:.....

Please indicate how often you feel the way described in each of the following statements. Tick one box for each.

		Never	Rarely	Sometimes	Often
1	I feel in tune with the way of life around me.				
2	I lack companionship.				
3	There is no one I can turn to.				
4	I do not feel alone.				
5	I feel part of a group of friends.				
6	I have a lot in common with the people around me.				
7	I am no longer close to anyone.				
8	My interests and ideas are not shared by those around me.				
9	I am an outgoing person.				
10	There are people I feel close to.				
11	I feel left out.				
12	My social relationships are superficial.				
13	No one really knows me well.				
14	I feel isolated from others.				
15	I can find companionship when I want it.				
16	There are people who really understand me.				
17	I am unhappy being so withdrawn.				
18	People are around me but not with me.				
19	There are people I can talk to.				
20	There are people I can turn to.				

Section 8

Health Checklist (1)

Idno:

How frequently do you experience the following?

	Very rarely 1	Rarely 2	Sometimes 3	Often 4	Very often 5
1 Headaches					
2 Sore throats					
3 Feeling faint/dizzy					
4 Pains in the chest					
5 Trembling/shakiness/feeling 'jittery'					
6 Poor appetite					
7 Crying or feeling tearful					
8 Back pain					
9 Heart pounding or racing					
10 Nausea or upset stomach					
11 Indigestion or heartburn					
12 Achiness in your muscles					
13 Trouble getting to sleep					
14 Shortage of breath/feeling breathless					
15 Hot or cold spells					
16 A lump in your throat					
17 Numbness/tingling in your body					
18 Waking up too early					
19 Overeating					
20 Feeling of body weakness					
21 Heavy feeling in arms or legs					
22 Restless/disturbed sleep					
23 Bowel problems (such as constipation, diarrhoea)					
24 Skin rashes					
25 Dental problems (such as toothache, gum pain)					
26 Feeling run down					
27 Colds, coughs, flu					
28 Ear problems (ear ache, temporary hearing loss)					
29 Eye problems (sore/irritated/watery, blurred vision)					
30 Hands sweat and feel damp and clammy					
31 Smoking more than usual					
32 Drinking alcohol more than usual					

Health Checklist (2)

Idno:

How frequently do you experience the following?

	Very rarely 1	Rarely 2	Sometimes 3	Often 4	Very often 5
1 Repeated unpleasant thoughts that won't leave your mind					
2 Trouble remembering things					
3 Feeling easily annoyed or irritated					
4 Feeling scared for no reason					
6 Blaming yourself for things					
7 Feeling alone/isolated					
8 Feeling miserable/unhappy or downhearted					
9 Feeling panicky about the future					
10 Feelings of impatience and intolerance					
11 Worrying too much about things					
12 Feeling you have no interest in anything					
13 Your feelings being easily hurt					
14 Feeling that other people do not understand you or are unsympathetic					
15 Your mind going blank					
16 Feeling hopeless about the future					
17 Having trouble concentrating					
18 Feeling tense/keyed up					
19 Feelings of anger, resentment or bitterness					
20 Feeling everything is an effort	-	-			
21 Feeling lonely even if you are with other people					
22 Feeling you are worthless					
23 Wanting to shout or throw, smash or hit things					
24 Feelings of guilt					
25 Feeling you do not want to be bothered with people					
26 Wanting to be alone					
27 Having disturbing dreams					
28 Feeling it is just not worth doing anything around the home					
29 Being easily startled					
30 Finding it very difficult to relax					

Now I want you to look at your list of people and think about where you met them or how you came to meet them.

FOR DOG OWNERS

Are there any people on the list that you feel you met or got to know because you have a dog? - maybe people you meet when you are out with the dog, through dog clubs or shows, or just out shopping for the dog food, or even because people come up and talk to your dog.

Who? What sorts of things do you do together? (only animal related things?)

As we are talking about people you know through your dog, perhaps there are other people that come to mind who you feel should be on the list?
Who? What column?

	Person	Activity
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

FOR CAT OWNERS

If you were a dog owner I would ask you if there was anyone on the list that you feel that you met or got to know because of your dog? - maybe people you meet when you are out with the dog, through dog clubs or shows, or just out shopping for dog food, or even because people come up and talk to your dog.

Is there anyone on the list that you think you know because of your cat?

Who? What sorts of things do you do together/ (only animal related things?)

As we are talking about people you know through your pet, perhaps there are other people that come to mind who you feel should be on the list?

Who?

What column?

	Person	Activity
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Appendix 6. Outline interview schedule for study 8

Outline of interview areas

We thought it would be helpful for you if we were to outline the points and questions which we would like to cover when we meet. This gives you a chance to consider your answers and to reflect on particular examples that may be useful as illustrations.

Part one of the interview is a brief checklist of diagnostic symptoms of autism and Asperger's syndrome. This takes about 10 minutes.

Part two consists of background questions about Christopher and his pet. e.g the type of pet, its name, how long you have had it and whether it belongs to any family member in particular. We are also interested in any reason you may have had for acquiring this pet, and whether you have other pets in the family. If you have had pets which are no longer living with you (perhaps died or rehomed) we would be interested to hear of Christopher's reaction to the pet's disappearance, and your views on how Christopher might react when this current pet dies or for some reason is no longer around. Again this part takes about 10 minutes.

Part three asks you to think about Christopher's relationship with you, with one other person you think important in his life, and with his pet. How would you characterise or describe each of these relationships? We would like you to think of each of these relationships and whether they are similar to each other and/or whether there are differences, and, if so, what these differences are.

In particular we would like to know what sorts of things Christopher does with you, with the other important person, and with his pet. Are there things that he does with one and not the other(s) or vice versa? Examples and anecdotes would be very useful.

Would you say that Christopher's relationship with each of you, the other important person, and the pet are generally positive? or negative? or are any of the relationships very changeable?

This part of the interview will probably take about 20 minutes.

Part four looks at some of the features and behaviours in each of the relationships between Christopher and you, the other important person, and the pet. Again, any examples you can give will be most welcome. We would particularly appreciate your views on whether there are noticeable differences between the relationships in these behaviours.

The behaviours and features we are interested in are

a) **Greeting** - does Christopher greet the pet? How? When? Is this consistent or is it changeable in any way?

We then ask you the same questions for whether Christopher greets you, or the other important person in his life.

b) **Seeking out or wanting to be near** - does Christopher ever seek out his pet? Is this at any particular times? This could be actual times such as mornings or when he comes in from school, or it could be at times when Christopher is upset, or happy, or fed up. Why does Christopher seek out his pet then, and what does he do when he goes to his pet?

We then ask the same questions for seeking out or wanting to be near to you or the other important person.

c) **Talking** - does Christopher talk to his pet? What does he talk about? Is it as if he were talking to another person, or is it a different way of talking? Is it like thinking aloud or more like a conversation? Why do you think he talks to his pet?

We then ask about how and when Christopher talks to you, and to the other important person.

d) **Play** - does Christopher play with the pet? In what way? Does he start the game? Is the pet joining in or is it 'just there'?
What sorts of things does Christopher do to play with you or the other important person?

e) **Sensitivity to others** - does Christopher seem sensitive to the needs of the pet? For example, does he know if it is ill or tired or does not want to play? Is Christopher sensitive to your needs or those of the other important person? Does he notice moods, or signs of illness in others? If you can think of examples these would be very useful.

f) **Emotional comfort and sense of security** - does Christopher seem to get emotional comfort from the pet? If so, when (for example if he is frightened, upset, angry etc.) What does he do? Are there times when Christopher happier/feel more at ease if he has the pet with him (for example if a stranger comes to the house). Does Christopher get emotional comfort or a sense of security from you? or the other important person? If so, on what sorts of occasions? Are there any occasions when Christopher seems to feel 'safer' with the pet, or with you, or with the other person?

g) **Sharing feelings** - does Christopher share his feelings with his pet? When? Does he hide any feelings from it? What sorts of feelings? What about sharing feelings with you or the other important person? Or hiding feelings?

h) **Sharing humour** - does Christopher do things with the pet that make him laugh? What sorts of things? What about with you or the other important person?

i) **Conflict** - Is Christopher possessive over the pet, such as not wanting other people to give it attention? If so, what does he do? Is Christopher possessive over you or the other important person?

In a similar way, is Christopher jealous of attention the pet may receive, or of things the pet has (such a toy, a cushion) because he wants for himself? What about jealousy of attention you get, or the other important person?

k) **Expression of emotions** - what does Christopher do to show affection to the pet? What does he do to show affection to you or the other important person? Are there any differences in the amount or type of affection he shows toward these three relationships.

l) **Confiding** - does Christopher tell the pet 'special' secrets or tell it his problems or things he may be frightened or worried about? What sorts of things? And what about Christopher's confiding to you? or the other important person?

m) **Companionship** - does Christopher sometimes just seem to enjoy being with the pet, not really doing anything in particular? Do you have any examples that suggest this? And what about Christopher just seeming to enjoy your company, or that of the other important person?

n) **Caregiving** - does Christopher do anything to care for the pet? If so, how frequently and is it voluntary? Does he receive praise for this? Does Christopher do anything that could be regarded as helping or caring for you or the other person?

Does Christopher seem to notice if the pet seems ill or frightened? Does he comfort it? And does he notice these things in you or the other person? If so, what does he do?

Part five briefly asks you to reflect on the pet's behaviour.

1. Does the pet greet Christopher, for example when he comes home from school? What does it do, and what does Christopher do? Who seems to greet whom first?

2. Does the pet seek Christopher's attention in any way? (For example, wanting to be stroked or picked up). Does it do that with you? or anyone else?

3. Does the pet show affection toward Christopher. What does it do? Does it show affection to other people?

4. Does the pet do what Christopher tells it to do, for example come when it is called? Does it do that with other people?

5. Does Christopher take notice if the pet has had enough cuddling or enough playing and wants to stop?

6. Does the pet ask Christopher if it wants to be fed or to go outside? Does it ask other people?

7. Does the pet ever try to avoid Christopher. If so, when? What does it do? Does it avoid other people?

Finally we would like to ask if there is anything else you can think of which seems relevant but which we have not asked about. This is probably an oversight on our part and we would very much appreciate any suggestions which may add to our investigation.

Thank you for agreeing to meet us, I look forward to meeting you soon

Appendix 7. Questionnaire for Study 9

Questionnaire for owners of Dogs for the Disabled (DFDs)

This questionnaire is designed to help us gain insight into the changes that having a Dog for the Disabled may have made in your life. We hope that you will agree to take part in this survey. The information you give will be put together with that from other DFD owners in such a way that you are not identified individually, so you can be as truthful as you wish!

We would be grateful for a few background details. These will be confidential and will not be used to identify you in any way.

BACKGROUND DETAILS

- Q1. Your age

Q2. Your sex
- Q3. Nature of disability.....
.....
.....
- Q4. How long have you had your Dog for the Disabled?.....
- Q5. What are the main things you need the dog to do for you?.....
.....
.....
- Q6. Is there anything else that you wish the dog could be trained to do for you?.....
.....
.....
- Q7. Was it your own idea to apply for a dog? YES/NO
If you answered NO, whose idea was it?.....
.....
.....
- Q8. What improvements, if any, did you hope the dog would make to your life?.....
.....
.....
.....

Q9. Who lives with you at your current address? Please select from below

Partner..... Child(ren) please state ages.....

Mother..... Father.....

Other(s) please state.....
.....

Q10. Do you have any pets in your household besides your Dog for the Disabled? YES/NO

If YES, what pets do you have?.....
.....
.....

The remainder of the questionnaire consists of a series of short statements about having a Dog for the Disabled. You have to decide whether you agree with them or not, and which box you would tick to show how much or how little you agree.

For example

Statement : My dog causes a lot of extra work.

You select the box which you think most reflects how much you agree with the statement. If you agree with this, but not quite "strongly", you might tick box 6.

strongly disagree	1	2	3	4	5	6	7	strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Please read carefully the following statements and indicate how much you agree or disagree with them. Remember the statements are about your Dog for the Disabled, not any other dog you may own.

Q11. People often stop me to talk when I am out with my dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Q12. My physical health seems better since I had the dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Q13. My dog is a valued member of my family.

strongly disagree	1	2	3	4	5	6	7	strongly agree
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

2

Q14. I often find myself telling my dog my troubles.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q15. Now I have my dog I feel confident that I can cope more independently.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q16. I have made new friends through my dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q17. There have been times when looking after the dog has been a physical strain for me.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q18. I like to have the dog with me even when I do not need him/her to do things for me.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q19. I think the dog stops me worrying about my health.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q20. There are places I do not go to because I do not like taking my dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q21. I wish my dog were more reliable in his/her work.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q22. When I am sad, my dog is one of the first I turn to.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q23. People do not 'talk down' to me when I am with my dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q24. I do not seem to have so many days feeling poorly since I had the dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q25. I would like to keep my dog even when he/she is too old to work for me.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q26. The dog has not made such a big difference to my life as I had hoped.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q27. My dog is just a working dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q28. I am often lonely even though I have my dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q29. I have a better social life now I have the dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q30. Perhaps having a dog was not the right decision for me.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q31. I relax more since I had the dog

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q32. I often put my dog's needs before my own.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q33. I feel less well in myself since I had the dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q34. My dog is more important as a friend than he/she is as a working dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q35. If anything happened to my dog I would feel devastated.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q36. I wish people were more interested in me rather than in my dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q37. I do not think I would want another D.F.D. when this dog has gone.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q38. If I am feeling tense, the dog usually makes me feel worse.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q39. I share most of my feelings with my dog.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q40. My dog is one of the most important relationships I have.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q41. The dog causes more trouble than it is worth.

strongly disagree	1	2	3	4	5	6	7	strongly agree

Q42. Is there anything else you would like to tell us about your experience of having a Dog for the Disabled?.....
.....
.....
.....

Thank you. We shall let you know the results in a future newsletter.

Appendix 8 - materials for Study 10

Contraindications checklist

Mental arithmetic task

Reading task

Perception of experiment questionnaire

Stress adjective checklist

Contraindications checklist

Due to the nature of the experiment, a number of rapid determinations over a relatively short period, some subjects although not at risk from normal routine determination of blood pressure, should be excluded from the experiment. These may include:

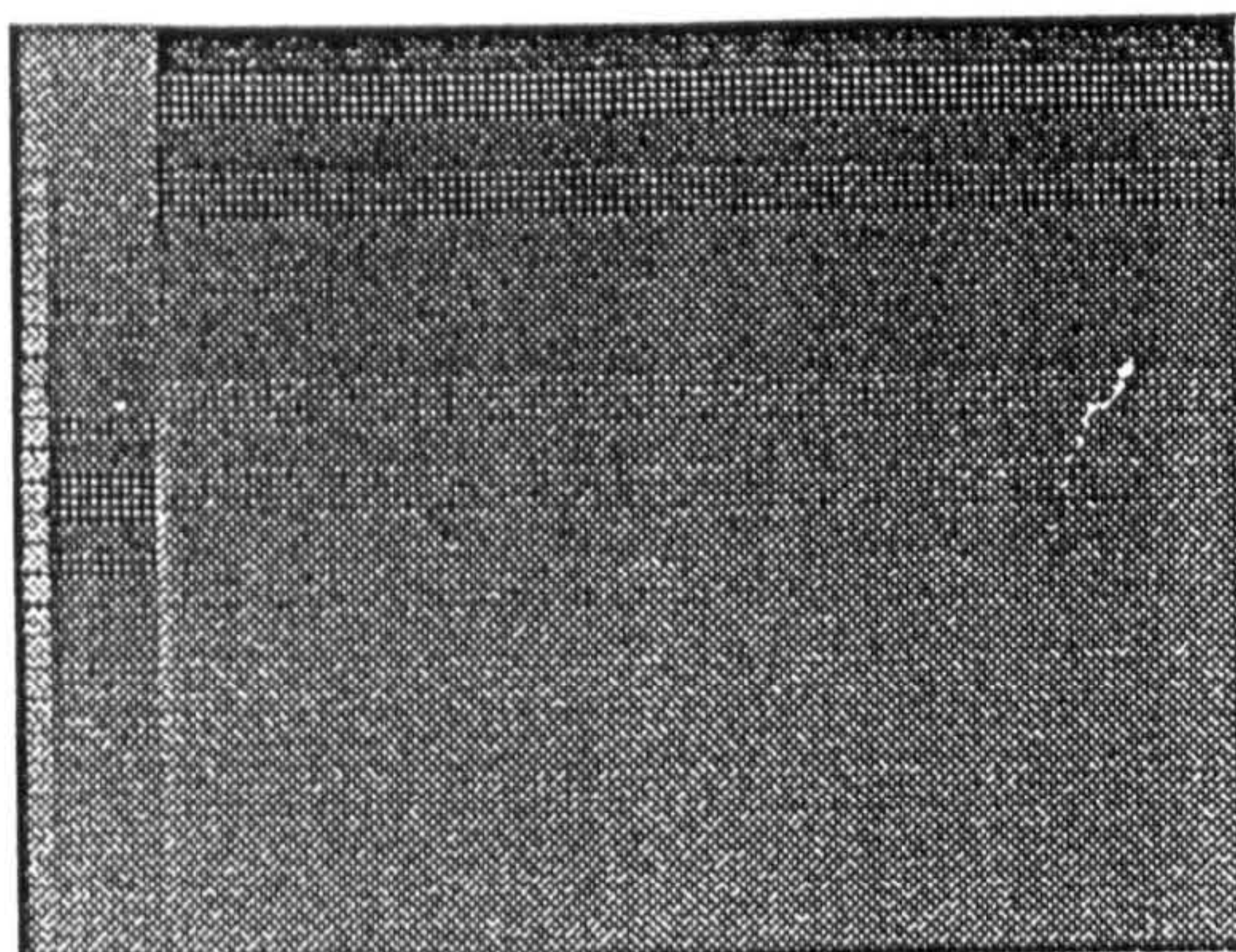
Visual Appearance:	
Contusion	Large X Small X ✓
Sprain (Wrenching of a joint)	X
Strain (over-use or stretching):	
• muscle	X
• ligaments	X
• cartilage	X
Oedema (effusion of fluid into the tissue, surface pits when pressed)	X
Scar Tissue:	
• old scars (white)	Depends on nature
• new scars (red)	X
• burns/scalds	X
NB - be cautious and inquire as to the nature of scars, as these may be due to previous surgery, such as arterial or arthroplasty.	
Psoriasis (chronic skin disease characterised by scales, common on elbows)	Depends on severity
Eczema (inflammatory skin disorder, common on elbows)	Depends on nature and severity
Petechiae (red/purple patches due to haemorrhages into the skin) e.g. Purpura.	X
Friable skin	X
Rheumatoid arthritis	X
Palsy (creeping, crutch, Erb's)	X
Obesity (those exceeding or nearing the recommended cuff circumference)	X

Allergy to animals:	
Asthma (chronic, inflammatory disorder that produces sporadic narrowing of airways)	Animals or emotional upset can act as triggers

Circulatory Disorders:	
Raynaud's disease (spasm of the arterioles of the extremities)	X
Varicose veins (usually those of the leg)	X thigh cuff
Phlebitis (inflammation of a vein)	X thigh cuff
Previous history of thrombosis	X
Previous history of embolism	X
Anticoagulants, Antithrombotics, Antiplatelet, Fibrinolytics e.g. heparin, warfarin, dipyridamole, streptokinase. Often prescribed following: thrombosis, embolism, arterial, cardiovascular and cardiothoracic surgery.	X
Varicose ulcers	X thigh cuff
Disorders of cardiac rate e.g. tachycardia, atrial fibrillation (unable to accurately determine subjects HR using Dinamap).	Depends on disorder and nature of treatment
Buerger's disease (intima of arteries thickened and thrombus form in lumen)	X
Haemophilias	X
Behcet's Disease	X
Diabetes	X
Anaemia	Depends on type

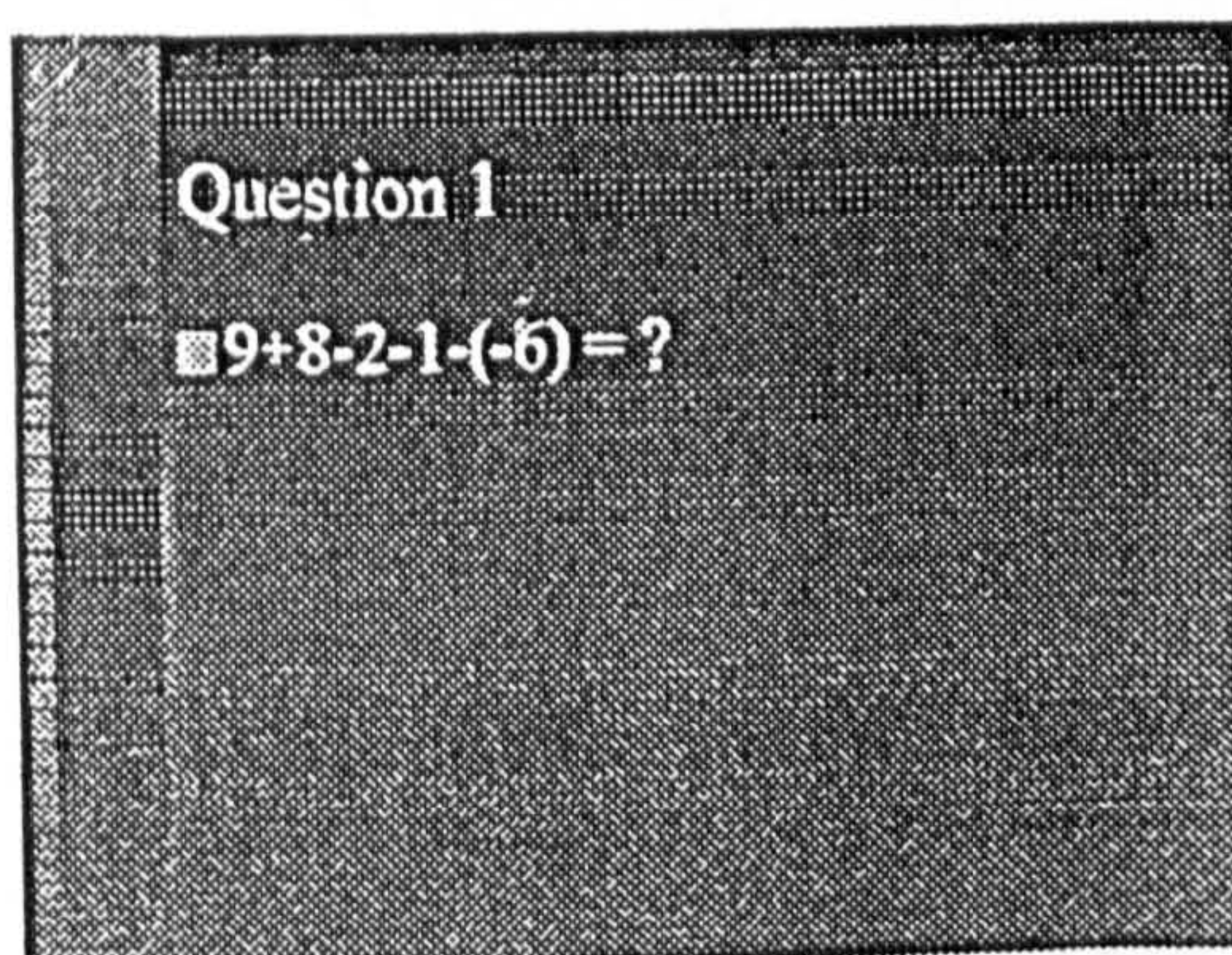
Heart Disorders:	
Anti-coagulants e.g. heparin, warfarin, phenindione.	X
Aspirin (increased risk of bruising)	Depends on disorder and nature of treatment
Antihypertensives:	
1. Beta-Blockers (Beta-adrenergic blocking agents [inhibit secretion of renin - decrease stroke rate]) e.g. propranolol, oxprenolol.	X
2. Angiotensin converting enzyme (ACE) Inhibitors e.g. quinapril, captopril. [block formation of angiotensin II promoting vasodilation].	X
3. Vasodilators/CA++Antagonists e.g. nifedipine (Adalat), amlodipine [slow inflow of Ca2+ into vascular smooth muscle fibres].	X
Diuretics (may cause tingling in hands and feet)	Check with subject
Bronchodilators (may cause rapid heart rate and palpitations)	Check with subject
Angina (may be taking beta-blockers)	Depends on disorder and nature of treatment

Mental arithmetic task



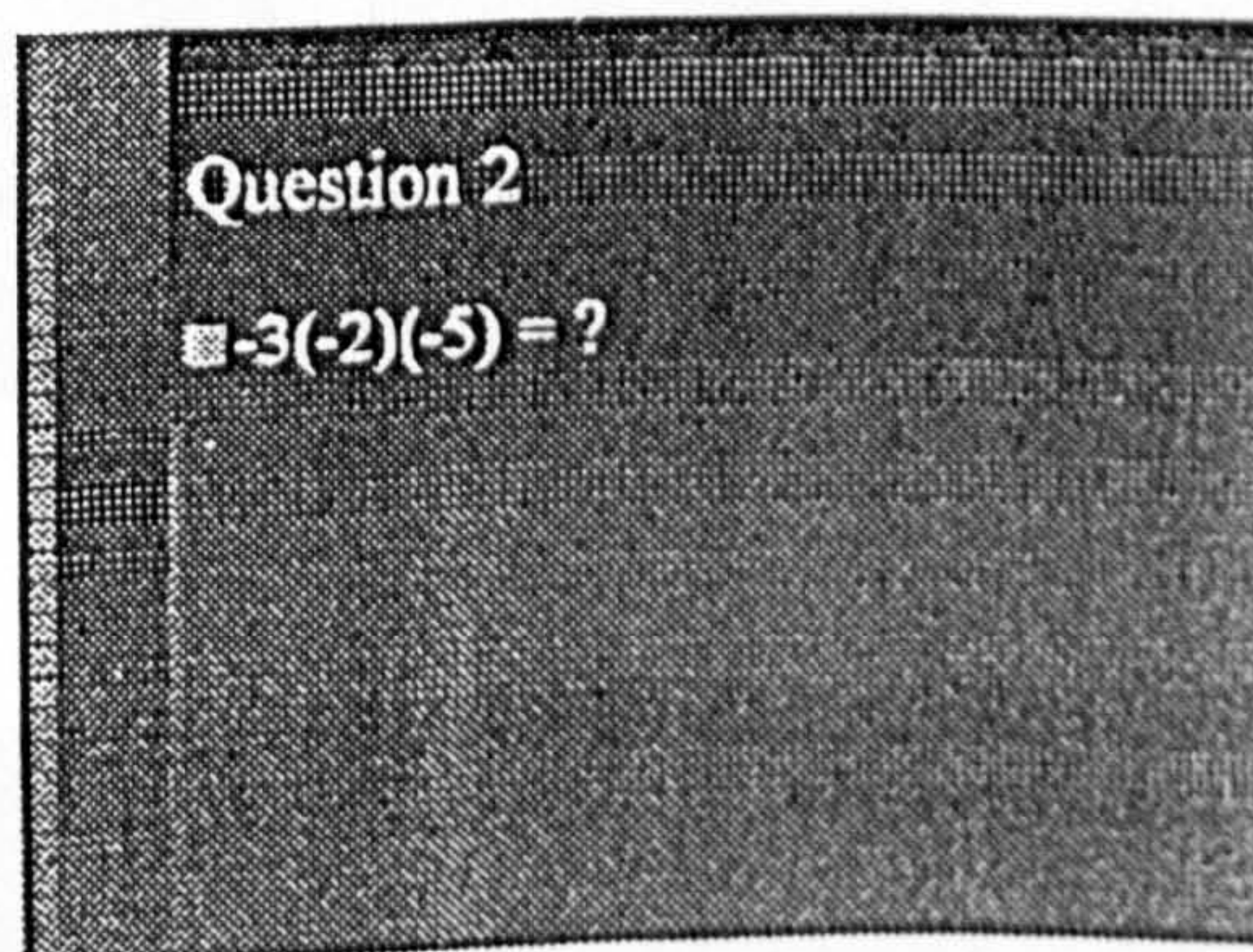
Instructions

- A short mental arithmetic task will follow.
- There will be twenty problems to solve in all.
- A new problem will be presented every fifteen seconds.
- Please attempt every question.
- Missed answers will be counted as incorrect.
- Write down **ONLY** the answer.
- Please raise your writing hand when you are ready to start the task.



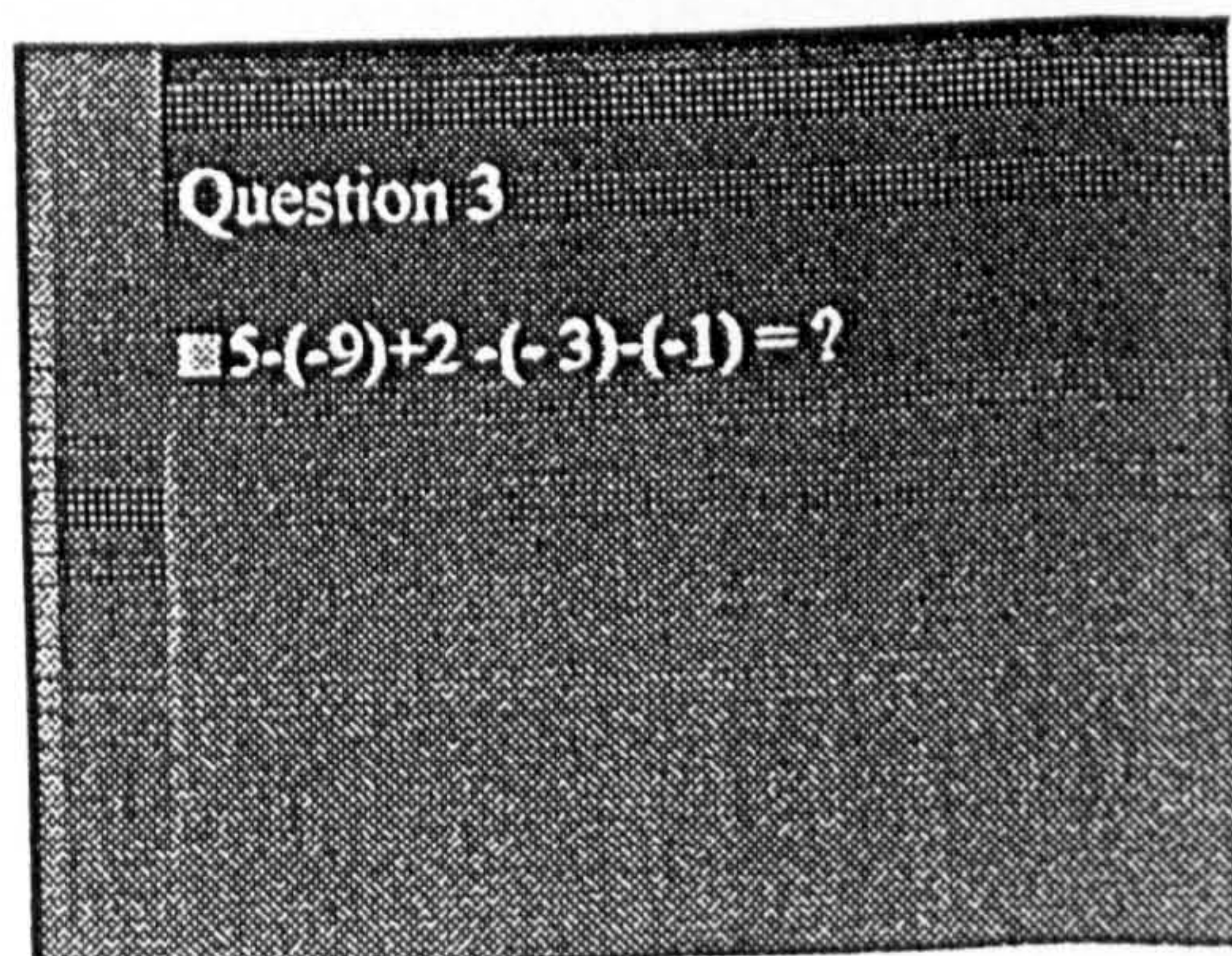
Question 1

$$\blacksquare 9+8-2-1-(-6)=?$$



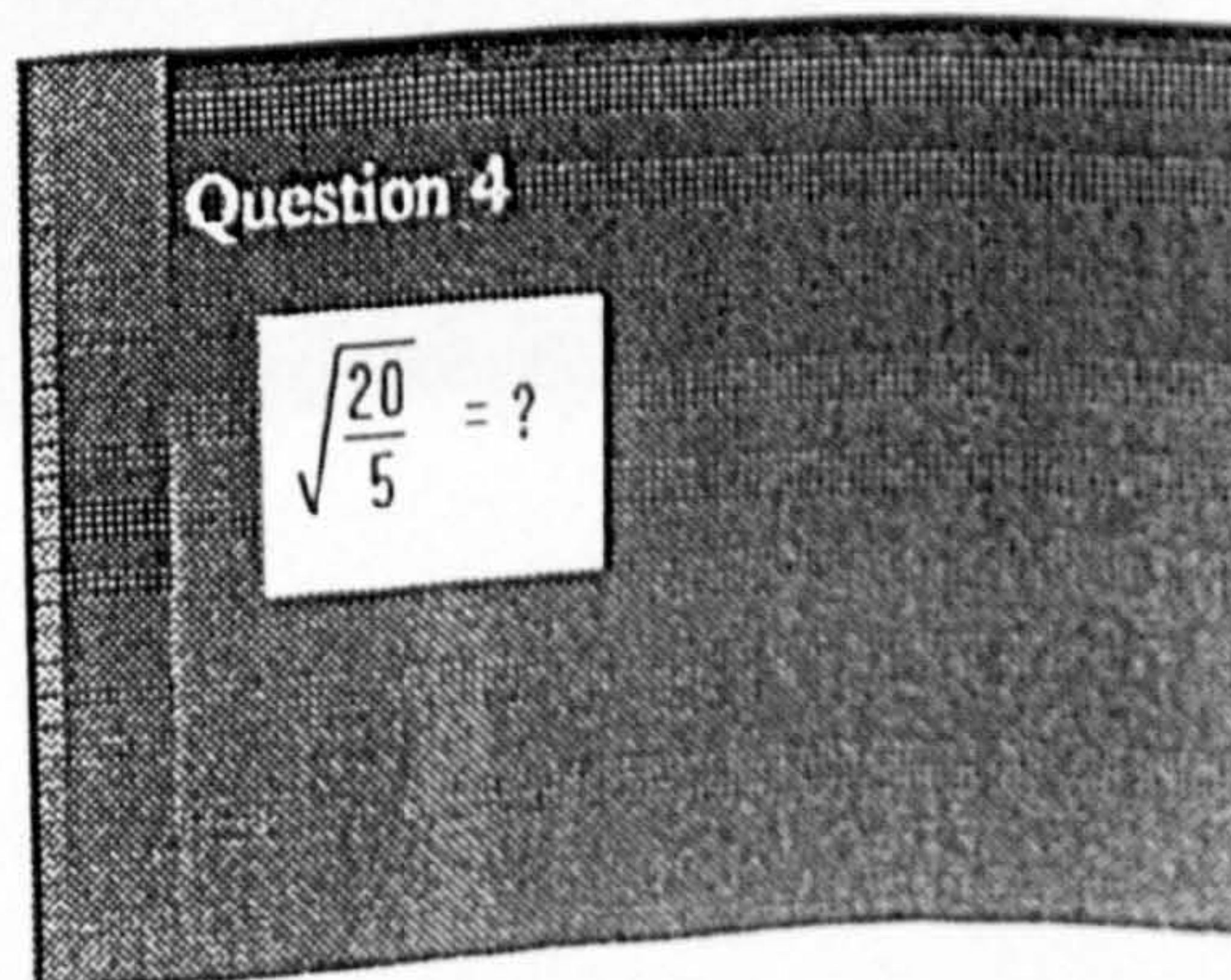
Question 2

$$\blacksquare -3(-2)(-5)=?$$



Question 3

$$\blacksquare 5-(-9)+2-(-3)-(-1)=?$$



Question 4

$$\sqrt{\frac{20}{5}} = ?$$

Question 4

$$\sqrt{\frac{20}{5}} = ?$$

Question 5

$$5^2 + 2^3 = ?$$

Question 6

$$2 - (-7) - 3 + (-11) - 20 = ?$$

Question 7

$$-2 \times (-4) \times (-3) = ?$$

Question 8

$$-3(5)(3) = ?$$

Question 9

$$-8 - 3 - (-1) - 2 - 1 = ?$$

Question 10

$$-5^3 = ?$$

Question 11

$$\blacksquare 3 + (-2) + (-1) + 4 = ?$$

Question 12

$$-4^4 = ?$$

Question 13

$$\blacksquare -6 \times (-2) \times (-3) = ?$$

Question 14

$$\blacksquare \text{When } 17 = 4X - 11, X = ?$$

Question 15

$$\blacksquare 4 - (-6) - 3 + 11 - 14 = ?$$

Question 16



$$\text{When } \frac{X}{5} = 3, X = ?$$

Question 17

$$4^3 = ?$$

Question 18

$$\blacksquare 1.375 + 0.25 = ?$$

Question 19

$$-2^5 = ?$$

Question 20

$$\blacksquare 6 + (-1) - 3 - (-2) - (-5) = ?$$

Reading task

The Way of the Voyager

Standing on the shore of Puluwat and looking out upon the ocean there is little to see but water and sky. The scene is alive with wind and waves, with birds flashing in the sunlight and clouds marching slowly past, but otherwise it is empty. Puluwat seems a patch of land thrust up from the bed of the sea, alone in an endless expanse of sparkling water. Yet if the view is to the east, or to the west, we know that just a few fathoms down there is a great reef teeming with fish, swimming to breast the current which flows steadily, first this way and then that, over and through miles of coral and sand before its water runs over the edge of the reef and back down again to the cold depths of the ocean. This much perhaps we can picture and make real in our minds. Yet beyond this there is more, and it too is real. It is this farther reality which stamps a unique meaning on the life of every man, woman, and child on Puluwat.

What lies beyond is a world of little islands, some inhabited and some not, but each with its own special shape and nature, and each in its own assigned place upon the vast surface of the sea. As one thinks of these islands, one over there, another there to the north, a third over here closer, Truk rising high from the sea off in the east, and many more among and beyond these, with reefs stretched between, the sea itself is transformed. No longer is it simply a great body of water which, encountering Puluwat, shoves around it and reforms on the other side to flow on to an empty eternity. Instead the ocean becomes a thoroughfare over which one can think of oneself moving, other islands left behind to right and left, toward a particular island of destination which as one comes up upon it will be waiting, as it always waits, right where it is supposed to be. When a Puluwatan speaks of the ocean the words he uses refer not to an amorphous expanse of water but rather to the assemblage of seaways which lie between the various islands. Together these seaways constitute the ocean he knows and understands. Seen in this way Puluwat ceases to be a solitary spot of dry land; it takes its place in a familiar constellation of islands linked together by pathways on the ocean.

The Puluwatan pictures himself and his island in his part of the ocean much as we might locate ourselves upon a road map. On a road map places, mostly communities, appear as locations with names, linked by lines of travel. Those we know from having visited them spring to mind, the buildings, the people, the spirit of the place. Those we know only at second hand have an image much less clear, and some are nothing but names. But each has its place, and there is a way to get to each one. Each too has its part to play in the totality which is a state or region or country. So it is with the island world of the Puluwatan. He knows of many islands and can visualize where they are and how to get to them. Some he has visited; he knows people and places on them which set them apart. Others he has heard about because people from them have visited Puluwat, and Puluwatans have traveled the seaway there on their canoes. Still other more distant islands are spoken of only by their names and legends. The navigators know the star courses to them but have never traveled these courses—but if they did they know the islands would be there.

Historically it was essential that Puluwat be a part of this larger island world. It would never have developed as it has if it stood alone. Dozens of islands stretched over a thousand miles of ocean from Yap on the west to Truk and the islands beyond on the east have been linked by their seafaring men and their sailing canoes into a network of social, economic, and often political ties without which they probably could not have survived, much less evolved the complex and secure way of life they now enjoy. The opportunity to exchange people, goods, and information permits these tiny communities to survive disasters, notably

Perception of experiment questionnaire

Mark with a cross (X) the point on the scale that best represents your experience of the measuring equipment used, the experimental procedure, and the experimenters. Mark O if you have no opinion or if your evaluation is in the middle of the two characteristics.

1. *When the blood pressure cuff on your arm was inflated, was it :-*

Comfortable |-----|-----|----- O -----|-----|-----| Uncomfortable
Very Moderately Slightly Slightly Moderately Very

2. *Was the strap fitted around your chest to monitor your breathing rate :-*

Uncomfortable |-----|-----|----- O -----|-----|-----| Comfortable
Very Moderately Slightly Slightly Moderately Very

3. *Did you feel that, on the whole, the experimental situation was :-*

Pleasant |-----|-----|----- O -----|-----|-----| Unpleasant
Very Moderately Slightly Slightly Moderately Very

Threatening |-----|-----|----- O -----|-----|-----| Non-threatening
Very Moderately Slightly Slightly Moderately Very

Serious |-----|-----|----- O -----|-----|-----| Humorous
Very Moderately Slightly Slightly Moderately Very

Informal |-----|-----|----- O -----|-----|-----| Formal
Very Moderately Slightly Slightly Moderately Very

4. *Please rate the experimenters on the following characteristics :-*

Friendly |-----|-----|----- O -----|-----|-----| Hostile
Very Moderately Slightly Slightly Moderately Very

Intimidating |-----|-----|----- O -----|-----|-----| Reassuring
Very Moderately Slightly Slightly Moderately Very

5. *Did you view the experiment as :-*

Important |-----|-----|----- O -----|-----|-----| Trivial
Very Moderately Slightly Slightly Moderately Very

6. *How much effort did you make to perform well on the experimental tasks? Did you make :-*

Very little effort |-----|-----|----- O -----|-----|-----| Great effort
Very Moderately Slightly Slightly Moderately Very

Self-assessment form

Subject No.

Task: Reading aloud / Mental Arithmetic (*circle one*)

1. Please rate how relaxed / tense you feel. Mark with a cross (X) where you think you would fit on the scale below. Mark O if you think you would be in the middle of the two characteristics.

Relaxed | | | O | | | Tense
 Very Moderately Slightly Slightly Moderately Very

2. Please rate how difficult / easy you found the task. Mark with a cross (X) where you think you would fit on the scale below. Mark O if you think you would be in the middle of the two characteristics.

Difficult | | | O | | | Easy
 Very Moderately Slightly Slightly Moderately Very

Self-assessment form

Task: Reading aloud / Mental Arithmetic (*circle one*)

1. Please rate how relaxed / tense you feel. Mark with a cross (X) where you think you would fit on the scale below. Mark O if you think you would be in the middle of the two characteristics.

Relaxed | | | O | | | Tense
 Very Moderately Slightly Slightly Moderately Very

2. Please rate how difficult / easy you found the task. Mark with a cross (X) where you think you would fit on the scale below. Mark O if you think you would be in the middle of the two characteristics.

Difficult | | | O | | | Easy
 Very Moderately Slightly Slightly Moderately Very

Stress adjective checklist

How well do these words describe how you felt during the task? For each word, please circle one of the numbers from 1 (does not describe at all well how you felt) to 5 (describes extremely well how you felt).

		describes moderately well		describes extremely well		
		does not describe at all				
1.	alert	1	2	3	4	5
2.	careless	1	2	3	4	5
3.	enthusiastic	1	2	3	4	5
4.	despondent	1	2	3	4	5
5.	embarrassed	1	2	3	4	5
6.	competent	1	2	3	4	5
7.	unaffected	1	2	3	4	5
8.	proud	1	2	3	4	5
9.	ambivalent	1	2	3	4	5
10.	pleased	1	2	3	4	5
11.	disorientated	1	2	3	4	5
12.	concentrating	1	2	3	4	5
13.	exhilarated	1	2	3	4	5
14.	alarmed	1	2	3	4	5
15.	tedious	1	2	3	4	5
16.	in control	1	2	3	4	5
17.	determined	1	2	3	4	5
18.	calm	1	2	3	4	5
19.	unruffled	1	2	3	4	5
20.	resigned	1	2	3	4	5
21.	confident	1	2	3	4	5
22.	incompetent	1	2	3	4	5
23.	excited	1	2	3	4	5
24.	demoralised	1	2	3	4	5
25.	satisfied	1	2	3	4	5
26.	threatened	1	2	3	4	5
27.	dejected	1	2	3	4	5
28.	enjoyment	1	2	3	4	5
29.	meticulous	1	2	3	4	5
30.	failing	1	2	3	4	5
31.	relaxed	1	2	3	4	5
32.	unfocused	1	2	3	4	5
33.	unwilling	1	2	3	4	5
34.	distraction	1	2	3	4	5
35.	effortful	1	2	3	4	5
36.	achieving	1	2	3	4	5
37.	bored	1	2	3	4	5
38.	inept	1	2	3	4	5
39.	agitated	1	2	3	4	5
40.	inadequate	1	2	3	4	5

Are there any other words that you feel describe particularly well how you felt during the task?
